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ABSTRACT

Prepared from addresses and papers selected from those presented at the 13th Annual Association for Institutional Research Forum in May 1973, this collection deals both with the broad national issues facing postsecondary education, and with matters that are directly related to campus functions, such as computer simulation models. The tone of these presentations, reflecting a growing uneasiness, is not optimistic. The contributors on topics dealing with management, data systems, resources, faculty and students, say there is at least the need for improvement if not reform. They have analyzed the problem from their perspectives and suggest the direction change must take. The papers are divided into six categories: Imperatives in Postsecondary Education; Management Imperatives; Information Imperatives; Resource Imperatives; Faculty Imperatives; and Student Imperatives. (Authors/PG)

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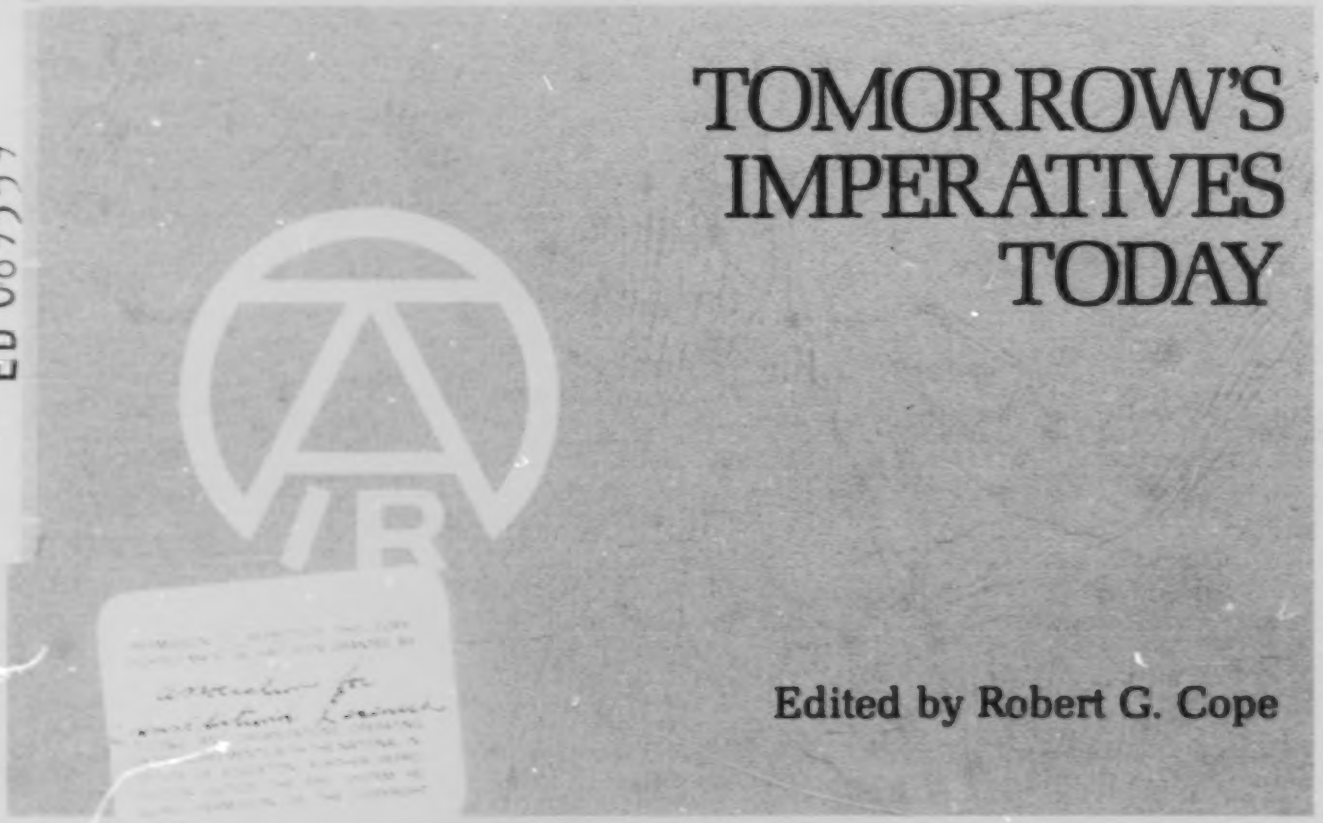

Edited by Robert G. Cope

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The Association for Institutional Research

TOMORROW'S IMPERATIVES TODAY

Edited by Robert G. Cope
University of Washington

Proceedings of the 13th Annual Forum
Vancouver, British Columbia

The Association for Institutional Research

Annual Forums on Institutional Research

1963 — The Role of Institutional Research in Planning
1964 — A Conceptual Framework for Institutional Research
1965 — Design and Methodology in Institutional Research
1966 — Research on Academic Input
1967 — The Instructional Process and Institutional Research
1968 — Institutional Research and Academic Outcomes
1969 — The Challenge and Response of Institutional Research
1970 — Institutional Research and Communication in Higher Education
1971 — Institutional Research and Institutional Policy Formulation
1972 — Reformation and Reallocation in Higher Education
1973 — Tomorrow's Imperatives Today

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Preface and Acknowledgements

Tomorrow's Imperatives Today, prepared from address and papers selected from those presented at the 13th Annual Forum in May 1973, deals both with the broad national issues facing postsecondary education and with matters, like computer simulation models, that are directly related to campus functions. The tone of these presentations, reflecting the growing uneasiness, is not optimistic. The prevailing tone is one of urgency.

The contributors, on topics dealing with management, data systems, resources, faculty and students, are saying there is at least need for improvement, if not reform. They have analyzed the problem from their perspectives and suggest the direction change must take.

The preparation of this volume was aided greatly by the advice of Clifford Stewart, by the careful preparation of contributors' manuscripts, and by the service of a team of conscientious reviewers: Paul Bradley, Jr., Mary Jo Clark, Robert Grose, Bertrand Hansen, Robert Pardon, Marvin Peterson and Gary Stock. Our hope is that this publication will advance the art of institutional analysis, at least a little.

University of Washington
October 1973

Robert G. Cope, Editor

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THE NEW VIGILANCE

A.W.R. Carrothers, University of Calgary

I accepted the honour of your invitation to give this keynote address, not out of any conviction that I have anything new to say to you, but because I detected in the invitation a recognition of the contribution being made regionally, nationally, and internationally by the Office of Institutional Research at the university of which I happen to be executive head. That office was created in my freshman year as President not because I had any great vision of bringing the science of management to solving the myriad problems of today's universities, but because I was persuaded by our Director's advocacy that such an office could play a major role in bringing peace, order and good government to an institution the condition of some of whose affairs seemed at that time to range from the ridiculous to the chaotic. Since then I have been persuaded on matters relating to the development of that office, again not because I understood the case at any technical level but because I was persuaded by the record of the office that institutional research was a sound investment in rationalizing structures, systems, and decision-making processes. A modern university in a modern world needs a mechanism that will provide relevant and accurate information to and about management. What I would like to talk about tonight is just that: the nature of the modern world which plays host to its universities; its significance to universities; the responses which an alert institution must be prepared to consider; and what that means for the role which offices of institutional research will be called upon to play.

A keynote address, as I understand it, is not supposed to say anything new to the conference participants. It should as best anticipate in a prosaic way the new ideas which the participants will reveal with professional clarity as the conference progresses. I come from a profession that spends much of its time in the past in the hope of anticipating the present. Your profession lives largely in the future, using what you can of the past and the present to determine what may be, in aid of those who must judge what should be. I therefore stand before you merely as a user's committee of one. I realize that this is an international conference. I hope you will forgive me if I talk about the country with which I ought to be familiar. The problems may not be that different, but I do not presume to lecture others on their affairs.

University Dependence on Tax Dollars

Of the 64 member institutions in the Association of Universities and Colleges of Canada I doubt that there are half-a-dozen which have endowments of sufficient substance that they can consider private dollars as providing any significant discretion in planning and operating their affairs. The rest overwhelmingly are dependent on tax dollars for their capital and operating budgets; even the proportion of income from student fees is going down as, in most jurisdictions, these stay frozen while costs rise. In this country, education is a provincial constitutional responsibility, and nearly all universities are creatures of provincial statute. Since 1967 the federal government has reimbursed provincial governments 50% of operating costs incurred in all post-secondary institutions. This very substantial federal commitment is based on the view that universities are much more than educational delivery stations: that they have an important role in research, in other matters of national interest, and in the performance of national responsibilities in international and world affairs. In short, collectively, they constitute a very considerable national asset.

The federal government had been involved in direct financing of universities on a per capita basis of provincial population for some 15 years prior to the 1967 cost sharing arrangements. The introduction of the new open-ended scheme coincided with a number of changes that reinforced one another to push universities into almost a messianic role. You are familiar with them: the explosion of basic scientific knowledge in the post-war period symbolized by sputnik; the rise of a new technology, symbolized and represented by the computer; the emergence of the social attitude that education is the key to our salvation; the consequent inflation of individual expectations; the rise in the percentage of young men and women of university age seeking access to universities — known to the boffins as "the participation rate."

As North America turned into the present decade, dragging behind it an economic recession from the tag end of the 1960's, a backlash against universities set in. First, as I perceive it, came general alarm over the escalation in educational costs, encouraged by prognosticators who projected educational costs as rising above gross national income before the turn of the century, coupled with

criticism from both business and labour that the world of learning was inappropriately remote from the world of work. Then came disillusionment from university graduates who could not find employment to their particular tastes. Then came an unpredicted levelling-off in enrollment — I suppose what might be called a stabilization of the participation rate. Then came a crisis in university management because institutions that were planning for growth and whose income related directly to enrollment could not balance their budgets. University dependence on tax dollars was no longer an hypothesis or an assumption or something one lived with, like earthquakes, birthdays, and other Acts of God; it was a brutal reality. Governments were not inclined to be moved by this new plight of the universities. Although informed members of the public, when they are reminded of it, are in my experience basically sympathetic to the unique role which universities perform in society, when it comes to the allocation of tax dollars they are very suspicious that there is fat in our budgets, and their suspicions are reinforced by apprehensions or misapprehensions respecting such matters as tenure; sabbatical leave; teaching loads; the quality of research and the motivation for research; the comparative neglect of freshmen and sophomores; and the fact that the one thing that universities claim they cannot account for is how a professor actually spends his time. I think also that there is recognition, more widespread than faculty may realize, that the freedom of the academic community protects other freedoms, and that a threat to the former deserves a response in the cause of all freedoms. Yet if those who influence public opinion believe that universities are in need of reform and are unconvinced that universities have reformed, they will not put their weight behind the universities' plea for help over a mere financial crisis.

At the present time universities are struggling to find their place within a new range of choices among post-secondary institutions in an atmosphere of popular interest in the institutionalization of "life-long learning," a concern which could itself have a distorting impact on educational institutions and selection of goals.

Increase in Government Interest in University Affairs

Along with the increase in university dependence on tax dollars has come an increase in the level of curiosity by governments about what universities do in fact. Governments are interested in academic programs, in the rationalization of graduate studies, in research policies and in how we manage our affairs. A new set of initials has emerged — H.Q.M. — Highly Qualified Manpower — which symbolizes government expectations of universities as they relate to economic interests and particularly to the marketplace for university graduates. Universities have always been repositories of highly qualified manpower, and governments have frequently called upon university personnel to advise on a wide range of economic and social issues and to represent governments in international affairs. Now governments want to know what universities are doing on their own initiative and how their production of graduates relates to social need. That is the "new relevance." In the last 12 years virtually every jurisdiction in Canada has had a public enquiry and report on education, from the Parent Commission in Quebec to the Wright-Davis Report in Ontario. People now speak freely of universities as public utilities, and of education as a right. Yet there is conflict with that quality of autonomy which is essential to the performance of the universities' unique role in the quest for truth and between the individual's interest in a right to an education and the state's interest in highly qualified manpower planning.

Most important of all, other social needs compete with education for the tax dollar, and heightened government interest in universities relates profoundly to the never-ending redetermination of public priorities. Education is a kind of experiment that failed to come off, and governments are not disposed to repeat it; they are looking elsewhere for success.

The Challenge to Assumptions

The environment of institutional dependence on substandial tax dollars and heightened government interest in what universities are doing, and therefore in what they should be doing, presents a challenge to virtually every conventional assumption about universities and their relations with governments.

Orthodoxy asserts that certain matters are the prerogative of governments, including the prerogative of creating public universities. By the same token, once a university is created, orthodoxy asserts that it takes on a quality tailored to its particular assignment of the quest for truth, wherever it may be found and in whatever direction it may take society, and the university has assigned to it an estate, that quality of independence, known as autonomy, commensurate to that task. Governments and universities, each in their own way, claim to serve the public interest. Nevertheless, they never really have lived in worlds of their own, and they are now, perhaps more than ever before, called upon to share the same path. May I be more specific.

Basically the allocation of public resources to universities is a government responsibility. Should universities be free to seek access to private resources? Has the private sector an interest in influencing the profile of public universities? Have governments a legitimate interest in the impact of such resources on the profile and capacities of public institutions? Should universities be free to assess student fees, or have governments a legitimate interest in education costs from the student viewpoint, to the extent that governments not only should control fees but also might consider the degree to which moneys conventionally made available fairly directly to institutions should be made available through the hands of the student? Should students, as they vote with their feet, carry tax dollars in their pockets?

Who should go to university? Traditionally, univer-

sities have determined admission standards within the policy of the open door. With the growing abolition of high school leaving examinations as a result of government policy, we may be moving to a completely open-door system, in which the new expectation may be that everyone is entitled to be an unqualified success. Will the government pay the cost? Should the interest in a new control mechanism over quantity and quality, which is inevitable, be perceived as unilateral or as a shared responsibility?

Heretofore governments have shown little direct interest in how public monies, once allocated, are in fact used. Universities determined the internal allocation to general undergraduate studies, to graduate education and research, and to vocational or professional training. I am sure as you heard those words you recognized in these matters a public interest of which governments may increasingly view themselves as stewards.

Not long ago universities were the sole occupants of the post-secondary educational field. They could strive to be all things to all men, for they were all that men had. In fact the great strength of public universities in the western provinces, like the land grant colleges in the United States, lay in their close identification with the needs, desires and ambitions of large numbers of citizens in the post-high school level of education. Now universities are challenged to identify their particular role among a number of kinds of post-secondary institutions. We can no longer be all things to all men; if we try we will fail, and will be blamed for it. Should we now be planning a retreat to the ivory tower? Universities must recognize the issue of identity as their challenge; but again, we do not operate in isolation, if for no other reason than that what we can do may depend on what public resources are made available to us.

I am no longer very confident when I use the terms short-, medium- and long-range planning, because I lack confidence in my judgment of their time spans. Yesterday's long range is often today's medium range and tomorrow's short range. But whatever long-range planning is, whatever may be the interest of the university in it, there is today an obvious government interest in it as well. The great uncertainty at the moment is how much planning is there likely to be or can there be and how is one to select the objectives to which the planning is to be directed. The case for shared responsibility is increasingly obvious.

Finally, we must reexamine the barricades of institutional autonomy and academic freedom. Are we any longer free — can we any longer afford to be free — to determine how to teach, how to carry out research, and how to organize ourselves to these tasks? Is there now a social interest in these matters as there is in what programs are to be offered, in the participation rate at both the undergraduate and graduate levels, and in the nature and extent of research? Have we not lost something of the legitimacy of decision-making in these matters that we used to enjoy? If we are right, as I believe we are, in continuing to insist that autonomy is an essential concomitant of our unique social role in the quest for truth, a role which gives universities a life force of their own, is our stronger claim to autonomy and freedom in the areas of what, how, and whom to teach not that by nature they are ours absolutely but that we can better exercise judgment in respect of them? If so, must we not stand ready to account for our judgment? We are sensitive to the fact that in internal university affairs leaders are constantly called upon to authenticate their leadership by the quality of their judgment, and that nothing is accepted as settled so long as the merest morsel of argument has been left unsavoured.

The Byzantine Condition of Post-Secondary Relationships

An important component in the Canadian education environment today, in addition to the challenge to conventional assumptions, is the pluralistic nature of interests. The British North America Act allocates education to the provinces, at least in and for the provinces, whatever that may mean; and provinces create educational institutions called universities. These in turn engage in activities beyond "education" in the constitutional sense, activities that naturally, properly and necessarily attract the interest of the federal government. Provincially created institutions congregate in a national association that is created, incorporated and regulated under the aegis of a special statute of the parliament of Canada. Even two-year "community" colleges are formed into a national association. Faculty speak at provincial, regional and national levels through their voluntary associations. Provincial ministers of education form themselves into a council with a central or national office. Research programs of universities, particularly in the natural and health sciences, are heavily influenced by national funding agencies and government departments, a matter that increasingly is attracting the interest of provincial governments in respect of programs, financing, and "rationalization." Research of course is interrelated with graduate studies and the production of our new acquaintance "highly qualified manpower," clearly matters of shared interest. Even learned societies, which heretofore functioned as genteel and scholarly academic guilds, are in particular cases politicizing themselves and setting themselves in judgment over certain forms of managerial activity.

The Internal Impact of the New Environment

The new challenge to old assumptions and the pluralistic nature of the educational environment are having their impact on the internal affairs of universities.

To begin with, faculty today feel threatened as they have never felt since the depression of the 1930's, which

means for practical purposes, such being the nature of the memory of man, as they have never felt before. They have been exposed to the policy of shared responsibility and they are disillusioned with it, for the results are not all that different from the bad old days of "authoritarian" rule. They are affected personally by the institutional identity crisis. It is a short distance from being threatened in one's employment to questioning the worth of the job. Faculty are mindful of the uncomfortable trade-offs at stake and their impact on individual economic and professional well being.

Their response is a highly predictable surge in the direction of collective bargaining. Whether collective bargaining comes as a matter of volition or as a matter of law, a great many things must be sorted out. When the mechanics are squared away, issues of mutual trust have been resolved, and the real bargainers identified, there still remains the fact that effective collective bargaining depends on the availability of data that both parties accept as relevant, reliable and complete. I shall return to this in a minute.

At the level of institutional management the challenges of the new environment are shaping behaviour. Undoubtedly hard times have a centripetal impact. So does the policy of accountability, for no sane person will accept responsibility for a matter beyond his control. So does the wilfullness of politics, because in an environment of unpredictability individualism will be surrendered for the protection to be sought in the herd.

I think it overstates the response to assert, as some would, that there has been a failure of nerve within institutions. I think it may be fairer to say that they are driving defensively. There certainly has been a loss in the political base of institutions. There also has been an escalation in the rate of turnover in administrative personnel that followed the adoption of term appointments in conjunction with the mechanisms of shared responsibility between faculty and administrators in the mid-1960's. The question must be faced whether there is an adequacy of leadership trained to the problems of politics, collective bargaining, systems management and public accountability, combined with the competing demands of "shared responsibility" and conventional academic management and, hopefully, academic leadership.

Two matters are of greatest concern to universities in the 1970's. One fear is that they will be reduced to a subsistence level of performance because of a substantial reduction in public priority given to this component of higher education. The other is that universities will be politicized as a consequence of a substantial rise in the level of governmental interest in what they do in fact, not simply because of the demand for accountability of governments, which inevitably passes on to tax supported agencies and institutions, but also because of a rising interest by governments in the utilization of the expertise reposing in our universities in the search for solutions to the increasingly complex issues facing governments today.

The Need for Interaction

The convoluted nature of our relationships is not going to be resolved, and the modern challenges to conventional assumptions are not going to disappear. We need to learn to manage our environment, or at least to manage ourselves in our environment. If universities have lost a measure of public confidence and hence a measure of the confidence of governments, so also is there rising apprehension within universities that they are to be exposed to prejudicial government policies created without an opportunity for them effectively to influence the determination of policies and their execution. That is the current "crisis of confidence." It is basically a crisis of communication. I have on another occasion used the analogy of a roomful of cuckoo clocks; when each clock thinks its time has come a bird pops out, has its say, and pops back in, quite indifferent as to whether it has been heard and quite uninterested in listening to others. Governments, universities and the public whose interests we both claim to serve desperately need to develop a philosophy of communication, a commitment to interaction, and from that to develop processes, or, to use current planning argot, an "effective interface," through which assumptions can be reviewed and progress made toward identifying and attaining long term objectives, by which we can influence our future. We cannot live by hidden controls and cryptic messages. Governments and universities together must resolve the uncertainties and minimize the risks of present unstable conditions. Universities must be prepared to do their homework, and governments must be prepared to treat them with candour. Neither governments nor universities can afford to be taken by surprise.

Above all there is need for mutual recognition of the problem of processes as it affects governments and universities today. Where there is recognition of objectives, however easy or uneasy those objectives may rest on the parties, it is comparatively easy to deal with processes. But where assumptions and objectives are subject to serious questioning, there is put into issue not only the role of universities, not only the role of the state, but the whole role of education in society over whatever planning span we may think we have or may in fact be given to us. The problem of processes therefore is the problem of how the parties are to live together in their condition of unsettlement and how the parties are to manage the interrelationship of processes and the identification of educational objectives and their priorities through the reconciliation of competing interests. Throughout must be recognized the risks attendant upon planning — not merely that planning

will be bad in the sense of less than competent, but that the clearer the planning the more obvious who will have and who will have not; who will benefit from the planned condition and who will perceive his destiny in rebellion against it. Rebellion, hopefully, within the political process itself. Throughout must be recognized the disparate nature and functions of governments and universities in our kind of society, and the legitimate role of institutional autonomy.

The *ad hoc* committee on planning of the Association of Universities and Colleges of Canada, of which many of you are members, was created toward the end of the 1960's with the intent of being concerned primarily with physical planning. When the boom went out of university growth the committee, at a conference at Lakehead University in 1970, which was inward looking and philosophical in nature, turned to the interrelationship of physical and academic planning. A further conference was held at the University of Calgary in 1972 at a more technical level, addressed particularly to the development of management information systems. In November, 1972, the committee met with its advisory committee, and shortly thereafter it brought to the Board of Directors of the Association a three-phase plan for grappling with the problem of developing an effective interface with governments. The Board adopted the plan enthusiastically. Phase one, which called for executive action, was completed in short order. Phase two took place in mid-March of this year. It consisted of a workshop of some two dozen persons, drawn from federal and provincial governments, universities, business and labour, to consider in a comparatively unstructured way these issues relating to the development of processes. Many of the points I have sought to make today came out clearly in that very intense and stimulating day and a half. I know I gained from it.

The workshop resolved that as a next step the committee should "assess the processes for planning long term development for universities in Canada with special attention to interactions of institutional, provincial, regional and national authorities." That step should be completed shortly, and as President of the Association I have asked the committee chairman to couple his report with proposals for the next phase in the exercise. I tell you this because I think it is worth noting than an *ad hoc* committee originally created to concern itself with physical planning expanded its mission to include the union of academic, physical and fiscal planning, and was instrumental in inciting the Association of Universities and Colleges of Canada to provide leadership in grappling with the new and critically important problem of processes.

The Role of Institutional Research

I have been talking about the processes of planning within universities, between universities, within governments, between governments and between governments and universities. That is emerging as the educational challenge of the 1970's. If it is not approached at the highest level of sophistication the game will be rough and public opinion may be a poor referee. Some may have no stomach for the game, which is understandable. Others may find their durability tested. Participants who are highly dependent on job satisfaction for a sense of personal well-being may be hard pressed to find alternative sources. I see institutional research in the 1970's as playing a major role of reinforcement to those who are charged with developing an effective planning interface between governments and universities. You are the staff, the boffins, the experts. You need not be reminded that you are not the policy makers; but you are the constants in the process of policy making, and you can be of major use in reminding administrators of what they need in supplying policy. We must be masters in our own house; we must be masters of the facts about ourselves, for only then will we be able to demonstrate our competence and thus to legitimize our claim to autonomy. At the political level you have no visible role, but again you can and must back up administrators with accurate and relevant information.

Until now institutional research has been meeting an institutional demand for costing services respecting the acquisition and allocation of capital and operating resources. It has served a need for systems development not only at the institutional level but at provincial and federal levels as well. It has met myraid *ad hoc* requests, and in the process it has taught administrators a thing or two about asking the questions they really want answering and asking them in an answerable form. I personally have the greatest respect for your collective perspicacity and accomplishments.

I think you now face a number of specific demands as you practice the applied science of systems engineering.

PPBS (Program Planning Budgetting Systems) is likely to be with us for a very long time. It requires particular adapation to university management, but governments have adopted and adapted it and we must continue to do the same. It will, as I see it, involve the process of prediction over a wide range of facts; the development of more and more sophisticated allocation models for operating resources; and the continuing refinement of the techniques of cost benefit analysis.

You doubtless will be called upon to provide data relating to the inter-institutional rationalization of research and graduate studies, and once again you may have to teach your interrogators how to ask the right questions.

The move to collective bargaining could well shift a special burden to institutional research. The negotiation of terms and conditions of employment is likely to raise issues quite distinct from those to which institutional researchers are accustomed. Perhaps the most important matter is whom are you there to serve. You understand now that

your duty is to apply your professional competence and standards to the institution, and you need not distinguish between the components of the institution. The answer to a question respecting a cost study does not depend on the identity of the questioner. If you can preserve that virtue in responding to demands for information to be laid on the bargaining table, you will be performing the best possible service to the institution as a whole. If facts are to resolve issues at the bargaining table they must be above reproach. On this I shall say no more for fear of saying too little.

Institutional research has always been an important contributor to academic planning. Today universities face particular issues in academic planning in the areas of continuing education and the concept of the open university. Here the university confronts a broad spectrum of social needs, from the conventional academic program, to professional retraining, to learning for leisure. We face major policy decisions. The burden will be made lighter by the availability of information respecting the educational marketplace.

There is a growing demand for management development programs for academic administrators. It has been my observation and experience that management consultants, in bringing their talents to bear on educational management problems, are extremely useful, for a professionally trained outsider can perceive deficiencies and design solutions which the insider cannot grasp on his own. But their models, which tend to be derived in the first instance, and often directly, from private enterprise, a very natural prototype for management science, will bend only so far to the needs of universities. The institutions must reach out to bridge the gap between the capacities of professional consultants and the particular needs of educational institutions. Those in institutional research may be called up to do just that.

Your particular forte is the development of management information systems. Information is the first step to planning. Planning implies control, and control implies a pecking order. You will be in the eye of this hurricane of systems development; and you will be called upon to share the product of your skills with other institutions, and to develop a coordinating apparatus.

Earlier in this address I referred to a number of conventional assumptions that are being challenged. I also suggested, more than once, that universities should take the initiative in stating the issues and proposals for their resolution. The universities should accept that onus and state their policies on such matters as size, participation rate, programs, financing and similar matters which add up to a statement of fairly concrete objectives. That at least would give a basis for dialogue with governments, and in the performance of the exercise it is conceivable that some problems might be identified and resolved and a number of questions might disappear. Then we will know that the residue contains the issues that need a lot of hard work.

I have been talking about the challenges and the crises of the decade of the 1970's. A hundred years from now what will be the centre of the university will not be the problems of administrators or the role of institutional research. It will be the liberal arts — not medicine, not law, not engineering, but the study of the nature of man. Furthermore, education is an instrument of social progress, and that will carry the day. The unique role of the universities will still be the quest for truth. That quest calls for rationality, which in turn establishes the role of rationality in management. That is the particular role of institutional research; that and the understanding of the limitation of rationality, for you must not let us quantify the unquantifiable. Institutional research is the new buffer between universities and the shifting forces of politics. "The price of liberty is eternal vigilance;" and a university must be "a place of liberty." We look to you, the professional rationalists, to bring a new vigilance to the challenges of our time.

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GOALS AND THE FINANCING OF HIGHER EDUCATION

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For several years, I have been brooding over the question of how higher education ought to be financed. I have been struck by disparity between American practice and that in most parts of the world. Most nations admit to their universities a smaller percentage of their population than we do, but once having admitted them they offer higher education without tuitions and often with heavy subsidies for living expenses. In the United States, on the other hand, we are constantly raising tuitions and are shifting more and more of our student aid from grants to long-term loans.

I have also been struck by what seems to be a radical change in American attitudes about higher education. For at least a century higher education has been regarded as a form of personal opportunity for the sons and daughters of low-income families. It has been thought therefore that it ought to be made available on the most generous terms. This, I have thought, was the idea underlying the Morrill Act, the establishment of the public urban colleges, the community college movement, and the GI Bill. I myself attended a state college (not far from Vancouver) which had open admissions, no tuition, and living costs so low that virtually anyone could get through. Why, I have asked, at this particular stage in our history when we still have the task of bringing millions of young people into the main stream of American life — many of them from ethnic minorities — are we suddenly shifting to high tuitions and long-term loans? Have we been misguided over the years and are we just learning about our mistakes? Or are we now committing a colossal blunder?

The puzzle is perhaps especially acute for me because many of the members of my own profession, economics, have been among the chief advocates of high tuitions and student aid in the form of loans. Thier viewpoint derives in part from the economists' traditional love affair with the market as an allocator of resources and their suspicion that the finance of higher education through the tax system represents an adverse redistribution of income.

As I have pondered these questions over the past five or six years, my ideas have evolved considerably. I have come to realize that the issues in the financing of higher education are primarily matters of value rather than of technique. The higher education system serves a multiplicity of goals. Some of these goals are mutually incompatible and some are assigned different priorities by different persons. Each of these goals when viewed in isolation calls for a somewhat different kind of financing. When these goals are viewed collectively, they call for a mixed system of finance not unlike that which currently prevails. The present system can be viewed as the product of the complex cross-currents of American politics. The system is not tidy; it is based on no single ideology; it is full of compromises; it is hard to understand; it fully pleases no one; it is likely to change through gradual evolution, not through radical departures. The basic policy question is: In what general direction should change be tending?

In my remarks this morning, I shall try to identify some of the goals that are sought through higher education and to explore their implications for financing.

Economic Growth and National Military Power

A major goal for higher education is nation economic growth. Many studies, as well as common sense, have indicated that learning in a wide variety of fields adds to the productivity of labor and that the kinds of basic and applied research conducted in universities also enhance the national product. Moreover, the connection between learning and national military strength has been widely recognized especially since World War II. Indeed, the revival of interest in higher education in the 1950's was sparked by the launching of Sputnik; the major breakthrough in federal educational legislation of that period was called the National Defense Education Act; and one of the major complaints of students during the height of the Viet Nam War was that higher education had become a tool of the Military Industrial Complex.

The goal of national economic growth calls for federal financing of higher education partly in the form of general support and partly in the form of categorical grants, loans and contracts intended to encourage particular kinds of training and research. Categorical support results in ever-changing emphasis in federal programs as old needs are fulfilled and new needs discovered. It tends to put universities in the position of producing for a "market" in response to rapidly changing demands of the federal government, and removes some of the decision-making

from the campus to Washington.

Supply of Professional and Other Skilled Persons

Another goal is simply to provide an adequate supply of professional and other skilled persons to serve the population. Society requires a reliable supply of physicians, dentists, nurses, teachers, lawyers, clergymen, accountants, engineers, soldiers, etc., just to take care of its elemental needs. Even in the founding of Harvard, the supply of professional workers, specifically clergymen, was a dominant consideration, and many of the state colleges were originally founded as normal schools to provide a supply of teachers.

Historically, because professional people were scarce and because some of the professions offered low renumeration, this goal called for a system of finance that would encourage students to enter the professions: low tuitions and student aid in the form of grants. Today, except in the health fields, the scarcities have apparently been largely overcome, and in the health fields incentives are strong because renumeration is high. So the need of special financial arrangements to encourage the supply of professionals is less strongly felt than it was in earlier generations and this goal probably calls for no special financial arrangements.

Citizenship and Civic Leadership

An American article of faith is that widespread education will produce an intelligent, informed, and responsible electorate. The drive toward universal secondary education nearly a century ago was promoted with citizenship as a major goal. Today the claim is made that near universal education for two years beyond high school can be justified on the basis of its contribution to citizenship.

This position suggests that education in the first two post secondary years should be tuition-free or nearly so. It also suggests that after the first two years the private benefit from higher education exceeds the social benefit and that substantial tuitions, or even full-cost tuitions, should rule for the upper-division, graduate, and professional years.

This position also rests on the argument that once students have experienced two successful years of college, have discovered their interests and abilities, and have appraised their opportunities, they should then be able to judge the private benefits of further education and should be willing to proceed under a system of high tuitions backed up by long-term loans.

This general view represents a neat compromise between those who would make higher education at all levels essentially tuition-free and those who would charge full-cost (or nearly full-cost) tuition at all levels.

Some uneasiness about the citizenship theory arises from the fact that many of those who favor wide extension of higher education in the first two post-secondary years are thinking of *vocational* rather than general education.

The citizenship proposal can also be questioned on the ground that citizenship may be advanced as much by a highly-educated civic leadership as by mass higher education at grades 13 and 14. The interests of the body politic might call not only for education on the part of the many but also deep education on the part of the few (but not too few). Society in seeking good citizenship may be justified in subsidizing education in the later as well as earlier college years.

Solution of Social Problems

A persistent goal of higher education is to provide the knowledge and the personnel to cope with social problems. Today our society has an especially wide array of felt social problems most of which are ntaional in scope and import. We wish to conquer poverty, achieve racial justice, renew our cities, restore order, improve health education, renew the environment, develop the arts, keep the peace, restrain world population growth, and aid developing nations. These tasks will require great bodies of new knowledge and great cadres of dedicated and professionally competent persons. They will stretch our resources in educated, sensitive, insightful people. Education and research are still our main hope for coping with these problems.

Solutions call for citizenship education of the many and liberal and professional education in depth of the indespensable technical and political leadership. Solutions also require research and scholarship in the natural sciences, the humanities, and the social studies.

An adequate attack on our national social problems would seem to call for broad federal support and encouragement of all aspects of higher education, not merely the first two years, not merely research in the natural sciences, and not merely mission-oriented programs of education and research. But in addition to broad general support, it would also require categorical aids to foster particular kinds of research and training.

Responsiveness to Social Needs

The allegation is often made that colleges and universities depend upon public support but are not responsive or accountable to any constituency. It is said that they are insensitive to the needs of the government, to the interests of their students, to the wishes of the various publics they serve, and to the broad social interest. It is argued that their governance and finances should be changed to make them more responsive.

No one can reasonably deny that colleges and universities exist to serve their society and that they have a deep obligation to work toward advancement of the

genuine interests of that society. The question is: How can this social responsiveness be best assured?

One way that is often advocated is to finance institutions through the price system. Instruction would be financed through tuitions received from students; auxiliary enterprises would be financed through fees to cover costs including capital costs; public service activities would be financed through payments from individuals, corporations, and public agencies receiving services; research and scholarship would be financed through grants or contracts from individuals, corporations, and public agencies. In this way, higher education would concentrate on those specific activities which someone on the outside would deem worth paying for. The distinction between proprietary and not-for-profit institutions and between public and private institutions would then largely disappear.

In recent decades, the system of higher education has moved perceptibly toward the market model. Contract research has become commonplace, tuitions and other fees have risen and services of auxiliary enterprises are increasingly priced at full-cost.

Another way of increasing responsiveness has been to alter the governance of institutions by subjecting them to site visits, inspections, audits, and reports, by placing them under the supervision of public coordinating bodies, and by direct legislation affecting programs, tuition, salaries, teaching loads, tenure, etc.

A question may be raised as to whether the "customers" on the outside are better able than the faculties and administrators on the inside to determine what is in the social interest. Concern for the long-run interests of students is surely a responsibility of the college and university, but it does not necessarily follow that better educational decisions will be made if students control a large part of the income of colleges and universities than if educational funds derive from unrestricted appropriations and gifts. Similarly, research and scholarship should promote the long-run interests of society, but it does not follow that better decisions about the development of science, the advancement of knowledge, and the enrichment of the culture will be made by outside individuals, public agencies, and corporations than will be made by faculties. Even in the case of public services, it is not self-evident that outside groups are bound to be right about the kinds of public services that are compatible with the total program and mission of colleges or universities. But to the extent that greater responsiveness to outside decision-making is sought, increasing finance through tuitions, fees, contracts, categorical grants, etc., is one way of achieving the goal.

Efficiency

In recent years, the opinion has become widespread that higher education is conducted inefficiently, and efficiency has been advanced as a major goal.

At the most global level, efficiency refers to the proper allocation of total resources to higher education so that the benefit from the last dollar allocated will be as great as the benefit from the last dollar spent for other purposes such as private consumption, urban improvements, domestic transport, military operations, etc. The argument is sometimes made that there are too many students enrolled, too large a research establishment, too many public services, etc., and that the growth of expenditures should cease until balanced margins are restored.

A second concept is that the scope of the enterprise may not be too great, but that higher education does not produce as much return from its total expenditures as it might. It is often alleged that it has surplus plant, the school year is too short, teaching loads are too low, the pace is too slow, technology is backward, and managerial technique is slack. By internal tightening up, it could allegedly produce a greater return at the same cost.

A third concept is that resources are not allocated properly among the various branches of higher education, among the various fields of study, between undergraduate and graduate instruction, or between teaching and research. For example, too much attention is given to academic studies and not enough to vocational studies, too many students are enrolled in expensive universities and not enough in community colleges, graduate study and research are being overdone, too few M.D.'s are being produced, too much attention is being given to theoretical and esoteric subjects and not enough to practical and applied subjects, etc.

An inherent difficulty resides in these allegations about efficiency. Though the inputs can be measured both physically and in dollars, the outputs or outcomes are largely non-measurable except through intuitive judgment. People of equal knowledge and integrity can reach quite different opinions. Devices such as cost-benefit analysis and program budgeting are not of much help when the benefits are so hard to identify. Even comparative cost data from different institutions are hard to interpret because programs are not the same and qualitative results may be quite different.

The efficiency question looks quite different to many educators from what it does to outside legislators or businessmen. Educators see an educational establishment of rapidly growing enrollments where society is continually loading on additional responsibilities, where faculty are working long hours, where academic standards have been rising and the richness of education has been increasing despite inadequacy of funds, where the academic quality of education and research is as high as anywhere in the world, where there is a perennial shortage of administrative and

non-academic staff to get the job done, and where financial precariousness is a way of life. The educator sees higher education as being under-funded in relation to the enormous tasks to be accomplished and in relation to the returns being yielded by expenditures for other private and public purposes. He sees higher education as comparing very favorably in efficiency with many segments of private business, with the health services industry, with local government, with federal agencies, with private foundations, and with the use of resources by private consumers. He sees his duty, in quest of efficiency, to seek more funds, not to cut back.

Educators are, of course, not the best judges of their own efficiency, and some external check is reasonable. One possibility is simply to slow up the rate of increase of expenditures and thus force institutions to cut back their expenditures of lowest priority until the "fat" has clearly been squeezed out. Another possibility is for a coordinating agency or some other public body to set standards of expenditure per student, perhaps on the basis of cost analysis, and to limit appropriations accordingly. The third is to rely on the price system — to allow competition to force institutions to hold down their costs to reasonable levels for the kind of service they are rendering and to charge high enough tuitions so that students will not utilize educational services in which they are not genuinely interested. One of the arguments often advanced for converting higher education to the market system is that efficiency would be promoted.

Minimizing the Scope of Government

A set of related goals are: (1) that government should not engage in activities that can be conducted privately, (2) that public subsidies should be used sparingly, (3) that public budgets should be balanced, and (4) that the price system has special merit as a device for allocating resources. These opinions of course lead to the view that higher education should be financed through tuitions and that students should be financed through loans.

One important technical fact about loans for the financing of students is that loans can be financed through the private capital market and need not show up in public budgets. Except for this fact the global economic effects of loans and grants are not very different. In either case, the funds are likely to be supplied by financial institutions, and later repayment constitutes a mere transfer. The economic cost of current higher education cannot be transferred to the future.

Equity

An important goal is equity among individuals and among social classes in the distribution of the benefits of higher education and in the distribution of the costs. In the distribution of benefits, wide and easy access of all classes of people to higher education of all types is perhaps the only requirement for equity. In the distribution of costs, the equity problem is more complex.

A common assumption is that costs should be distributed in some fashion between the student (and his family) and society (as represented by government and philanthropy). A reasonable basis of the division is often said to be *benefit*. The student should pay an amount corresponding to his private benefit in the form of life enhancement and increased earning power, and society should pay in proportion to social benefit. This formulation, however, presents difficulties because of differences of opinion not only about the relative extent of private and social benefits but also about what should be included in the costs.

As the economist sees the costs, they include: (1) foregone income by reason of the student's being in college and not in the labor market, (2) incidental expenses of college attendance, and (3) institutional costs of providing educational services. I estimate the amount of these costs (annually per student) as follows:

	Amount	Percent
Foregone income	$5,000	55%
Incidental expenses	500	6
Institutional costs	3,000	39
	$9,000	100%

The question is: What proportion of this $9,000 should be borne by the student and what portion by society?

Suppose one were to assume (as seems reasonable to me) that two-thirds of the benefit were private to the student and one-third were social. Students on the average, then, should bear about $6,000 and the public about $3,000. The $6,000 would be met if the student gave his time to the educational enterprise, paid for his incidental expenses, and contributed about $400 in tuition. Obviously the assumptions on which this result rests may not be universally acceptable. But for what these assumptions may be worth, they suggest that a major part of *institutional* costs should on grounds of equity be paid from appropriations and philanthropy.

Those who discount the social benefits from higher education and who reject the idea of foregone income will come to quite different conclusions. Indeed, differences in the interpretation of social benefits and foregone income underlie much of the conflict of opinion about the financing of higher education.

Equity in the distribution of costs also concerns fairness as between students who have affluent families to assist them and students who do not. If one assumes that

students are emancipated and that family income is not a consideration, then all should be treated alike. Either loans or grants would be appropriate. On the other hand, if one assumes that families when able are responsible to support their children in college, then fairness may require that the government and philanthropy act as surrogate parents for students whose families are not able to help. This would argue for grants rather than loans to needy students.

Still another equity issue concerns intergenerational fairness. The American tradition of higher education has encouraged low-income students to attend by means of low tuitions, modest scholarships, and part-time work. Under this system, generations of young men and women of low-income families have attended college without piling up lifelong indebtedness. We are now in the process of bringing another generation of young people, many of them minority origins, into the mainstream of American life via college. Is it fair to change the rules for this new group by requiring them to go into debt?

Considerations of equity on the whole favor a system of finance based on low tuitions coupled with grants rather than loans to low-income students.

Tempering Inequality in Income Distribution

A goal that is seldom mentioned directly but often implied is to use the higher educational system as a vehicle for reducing inequality in the distribution of income. The distribution of income is affected by higher education in two ways.

Higher education can influence the distribution of income directly because it takes money from taxpayers and spends it on students. If the taxpayers are on the average richer than students, income distribution will tend to be equalized; if the taxpayers are poorer than students, inequality will be accentuated. The conclusion is that either the tax system should be made more progressive or tuitions should be raised.

A more fundamental influence of higher education in income distribution derives from its long-run effect on relative wages and salaries of various classes of the population. If the percentage of the population attending higher education continues to grow, the supply of persons available for professional, skilled, and white-collar occupations will increase, and the supply available for blue-collar and unskilled occupations will decrease. As a result, the relative compensation of the two groups will change, and the distribution of income will become more equal. To achieve this result calls for a system of finance that encourages access, namely low tuitions and grants to students.

Access and Opportunity

One of the most widely-held goals of American higher education is that young people, regardless of their circumstances, should have access to as much higher education as they are qualified for and motivated to obtain. Today, this principle is being extended to adults of all ages and demands are being made for lifelong access. This goal of widest possible access is based on the ideas that access is tantamount to opportunity, both cultural and economic, and that widespread higher education will foster economic growth — through discovering talent, sorting people out according to their interests and abilities, and developing vocational skills. It rests also on the conviction, supported by considerable recent evidence, that the innate ability to benefit from college education is much more widely distributed than had previously been believed, and that new kinds of higher (or post-secondary) education could be devised to accommodate a large proportion of the population. This goal of access accounts also for the recent drive for "open admissions."

If access were the sole objective, it would call for a system of finance with institutions funded primarily by public appropriations and philanthropy and only secondarily by tuitions and with needy students funded primarily by grants and only secondarily by loans. However, as an alternative, access would not be curtailed very much if institutions charged high tuitions but needy students were assisted by correspondingly large grants.

Student Freedom

In recent years, the position of college students in our society has changed markedly. They are increasingly regarded as adults, they are given greater liberty in their ways of life, they vote, and paternalism on the part of both parents and educational institutions is on the wane. One of the goals of higher education today is to maintain or increase the newly-won freedom and independence of students in their selection of colleges, in their choice of courses and educational programs, in the mode of instruction and learning to which they are exposed, in their pattern of living, and even in their relations with their parents.

This goal calls for the finance of institutions through tuitions and the finance of students through grants or loans directly from government to the students, not via institutions. If students are the chief vehicle for bringing funds to the colleges, and are free to select colleges of their choice they will acquire substantial power over the educational process. Colleges will be forced to be attentive to student opinion and need.

The goal of student freedom also raises questions about the relation of students to their parents. In general, America has accepted the idea that parents are responsible, to the extent of their means, to finance the education of their children. But if the children are to be free and to be regarded as adults, they should at some point be emancipated from their parents. Should the time of emancipation be at age 18? Age 21? At graduation from college? At

completion of graduate and professional education?

America has been equivocal on this subject of emancipation. In general, graduate fellowships and assistantships have been awarded without a parental means test, whereas undergraduate awards have usually involved a means test. Yet, the G.I. Bill, one of our most far-reaching and successful student aid programs assumed that the veterans were emancipated from their parents regardless of age. In the past, when credit has been used to finance college education, parents have usually been the responsbile borrowers. But recently, as the use of credit has been increasing, the students are often assuming the responsibility of repayments. A persuasive argument for the newer loans of substantial amounts, long maturities, and contingent repayment features is that such loans make possible the emancipation of the student. Grants of equal amount would, of course, give them even greater freedom, but grants of equal amount are not likely to be forthcoming.

A more subtle aspect of student freedom is that the student should be free to choose his field of study without arbitrary admissions and retention standards, without arbitrary quota systems, and perhaps without differential tuitions for different disciplines. According to this view, the higher educational system should be responsive to the informed choices of students and not be managed by means of arbitrary admission restrictions and quotas designed to regulate the flow of people to different fields presumably in accordance with estimates of future manpower requirements. The case of medicine is often cited as a field that presents arbitrary barriers to thousands of well-qualified men and women who would like to become physicians and who are needed in the health service system. According to this concept of freedom, the higher education system should be planned primarily with the demand for places on the part of qualified students as the principal criterion rather than arbitrary estimates of professional associations, manpower planners, etc. A possible financial implication of this point of view is that the charging of different tuitions for different fields of study would unduly influence choices because relatively small sums of money might weigh heavily in the short run and produce bad decisions for the long run. A contrary viewpoint is that tuitions should, in the interests of efficiency, reflect the relative cost of different educational programs.

In general, student freedom probably calls for a financial system of high tuitions coupled with generous loans available without a means test and free choice of discipline without large fee differentials.

Academic Freedom

A venerated goal of higher education is academic freedom. This refers not alone to the right of professors to seek and speak the truth; it refers also to the power of faculties individually and collectively to decide what lines of research and scholarship to pursue, what to teach, how to teach, what standards to maintain, what public service activities are compatible with the main business of instruction and scholarship, etc. The assumption has been that in all these matters *professional* judgment comes into play.

Obviously, professional prerogatives do not justify social irresponsibility. On the other hand, there is no substitute for professional judgment in most educational and scholarly decisions. One of the inescapable problems of academic life is to achieve a reasonable balance between social control and academic control such that the genuine long-run interests of society are advanced. A major task of college and university presidents is to bridge the distance between the academic interests and the interests of the society beyond the campus. There is no simple solution to the problem, but the solution clearly does not lie in destroying academic freedom, in making the university a government bureau or market-oriented enterprise. To preserve the essentials of academic freedom, colleges and universities must have substantial unrestricted funds from appropriations, gifts, endowment; they must also have diverse sources of support so that they are not beholden to any single interest or influence. To maintain significant inner direction, the college or university must be trusted by the society; to maintain this trust while preserving academic integrity is one of the continuing problems of higher educational policy and administration.

Knowledge and Learning as Values in Their Own Right

In most contemporary discussions, higher education is viewed as a means to ulterior ends. However, learning on the part of both students and faculty, the discovery and dissemination of knowledge, artistic creativity, and the preservation and advancement of the culture can all be regarded as goods in themselves without reference to any specific instrumental purposes. Similarly, academic excellence can be regarded as intrinsically valuable. Moreover, if the experience of the past generation or two teaches us anything it is that knowledge gathered for its own sake, for the mere value of knowing, often proves to be useful in the most unexpected ways.

This goal of knowledge for its own sake argues for substantial unrestricted funds for higher education to be used as the academic community decides. Indeed, higher education is almost unique in our society as a place where learning and culture are pursued for their own sake. Our society should support at least one center where learning is cultivated in terms of its own intrinsic worth and not primarily as a means to ulterior objectives.

Geographic Dispersion of Educational Resources

Educational opportunity and resources should be distributed geographically so that opportunities for people,

and also the cultural and economic influences of strong institutions of higher education, are available in all parts of the country. Without preventive efforts, the ablest faculty, the best students, and the richest resources will gravitate to a selected few institutions in restricted areas of the country. Adequate geographic dispersion calls for federal aid to poorer and sparsely-settled areas, and for institutional control of significant amounts of student aid funds.

Diversity and Progressiveness

A goal of higher education is to achieve a diversity of institutions, programs, modes of instruction, and points of view to accommodate students of varied interests and objectives. A related goal is to encourage diversity in the sponsorship of institutions including federal government, state and local government, private non-profit organizations, and private business corporations. In a time of rapid relative growth of the public sector of higher education and increasing political influence over the public institutions, the survival and prosperity of the private sector is of special significance. The private sector, moreover, contributes much in leadership and quality to the higher educational system.

The goal of diversity calls for either of two policies: (1) supplemental aid to students who attend private institutions in order to compensate for the relatively high tuitions in the private sector or (2) raising tuitions in public institutions and thus narrowing the tuition gap.

Diversity and progressiveness also calls for substantial categorical aid for new institutions and new projects. A danger in such categorical aid is that it will encourage phony or ill-advised innovation. Another risk is that government and foundations will give temporary support for the novel without properly encouraging the strengthening and improvement of good features of the traditional. Solid change is an evolutionary process, not keeping up with an endless succession of fads and gimmicks.

Conclusions

The principal conclusion is that various goals, when viewed separately, call for different modes of finance. Can one consolidate the various strands of the argument into a coherent system of finance? The answer is yes, but because of differences of outlook and priorities, one man's coherence can be another man's insanity. I shall try to present the conclusions I have reached about the financial pattern that derives from the fifteen goals.

Colleges and universities should have substantial unrestricted funds, preferably from diverse sources, in pursuit of the goals of academic freedom, the advancement of knowledge and culture for its own sake, the promotion of national economic growth, the solution of social problems, and the cultivation of citizenship. These unrestricted funds might properly come in part from the federal government — especially for promotion of national economic growth and solution of social problems.

Federal and state governments should be able to influence — without dominating — higher education by means of categorical grants for goals such as economic growth, solution of social problems, geographic dispersion of educational resources, diversity and progressiveness of higher education, and general responsiveness of higher education to social needs.

A system of finance based on low tuitions coupled with student aid emphasizing grants would contribute toward the goals of access, citizenship education, equity, and tempering inequality of income (in the long run).

On the other hand, a system of finance based on high tuitions coupled with student aid in the form of either grants or loans (with student aid independent of institutions) would work toward student freedom, diversity and progressiveness, and improved income distribution in the short run. If this system were extended so that colleges or universities were market-oriented in all or most of their activities, goals such as responsiveness, efficiency, and minimum scope of government would be favored.

To meet the goal of diversity and progressiveness, special provision would be needed to improve the competitiveness of the private sector, either: (1) tuition equalization in the form of special grants to students to meet the extra tuitions of private institutions, or (2) higher tuitions in public institutions. I favor the first of these two, because I believe on other grounds that tuitions in public institutions should be kept moderate.

To meet the goal of geographic dispersion of educational resources, some substantial part of student aid should be under the control of institutions.

In my judgment, no simple solution to the problem of financing higher education, based on only a few goals and glossing over others, will serve. The only tenable solution for the finance of institutions is a blend of unrestricted funds and categorical grants from diverse public and private sources, moderate tuitions, and reasonable fees for non-instructional services; the wisest solution for the finance of low-income students is a combination of grants and loans, with grants providing bare minima to assure opportunity and loans used as supplemental sources to assure flexibility. Such loans might be long-term and have income contingent features.

My assessment of the goals leads me to question current tendencies toward converting colleges and universities into market-oriented institutions without strong inner direction, and equally to question current tendencies to finance low income students primarily through loans. The need is for judicious balancing of many goals and balancing the financial devices appropriate to these goals.

The system resulting from such balancing will never be tidy or simple. It will never achieve any objective fully. But neither will it destroy or handicap an educational system that has achieved first rank in the world in excellence and at the same time has extended higher educational opportunity more widely than ever before in world history.

The same conclusion was reached by Marion B. Folsum, a distinguished businessman, former Secretary of Health, Education, and Welfare, and a long-time leader of CED. He said:[1]

> The financial support of higher education is *a patchwork quilt*. This support is drawn from virtually every known source . . . This patchwork quilt . . . is *no jumble of confusion*. Instead, it is a significantly complete list of the groups that form the broad base of support for higher education in our society . . . If it is true that "*he who pays the piper calls the tune*," the integrity of higher learning is ensured by the fact that no one group can "call the tune." This broad base of support ensures that our system will remain free of a single, limiting educational creed. And this, in a sense, is the *genius* of American education — that there is no single interest, no one creed or dogma, that might stifle the freedom and independence we as people cherish.

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[1] Marion B. Folsom, "Who Should Pay for American Higher Education?" in *Economics of Higher Education*, Selma J. Mushkin (ed.) U.S. Department of Health, Education, and Welfare, OE 50027 Bulletin 1962 Number 5. Washington: U.S. Government Printing Office, 1962, p. 19.

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THE CHOICE OF A FUTURE

Joseph T. Sutton, University of Alabama

In following Robert Clark at the podium, my first impulse is to say, "Though I speak with the tongues of men and angels and have all knowledge so as to understand all mysteries, because I have to follow Robert Clark, I'm dead." And Don, I appreciate what you said about me. I was wondering what you would find to say. Actually, I was hoping that you would point out that my most significant attribute is that I'm so levelheaded. As you know in Alabama we have an operational definition of levelheadedness: that's a man whose tobacco juice runs evenly from both corners of his mouth.

An appropriate presidential address before the Association for Institutional Research should contribute new insights into the role and function of the profession so as to inspire the members with a clearer sense of direction into the future. I had aspirations to deliver such an oration — one that would not only vindicate the judgment of the members who entrusted me with this high office, but that would also enshrine forever the memory of this time and place in the hearts of my listeners. Having set this goal, I prepared carefully.

My homework included a re-reading of the papers and addresses of all former presidents and such institutional saints as Dressel, Lins, Russell, and Brumbaugh. At that point, I understood the feelings of Charlie Brown on the occasion when Lucy asked if he and Linus could describe what they saw in the piles of cumulus clouds overhead. Linus reported that he saw the stoning of Stephen, Michelangelo in the Sistine Chapel, and Napoleon at Waterloo. Then Charlie Brown said, "I was going to say I saw a goosey and a ducky, but I have changed my mind."

I also was required to make some change — at least, insofar as the title of this address was concerned. Originally, it was called "An Inquiry into the Epistomological Foundations of Institutional Research with Special Reference to the Resolution of Certain Teleological Antinomies." However, the girls in Don Lelong's office would not print that in the program. Then I proposed "Institutional Research and the Three B's — Books, Buildings, and Bodies — in the Garden of Learning. Will they live happily ever after?". At that point, they suggested that my speech should be called "How to Meet Yesterday's Imperatives Tomorrow." Regardless of the title, I'm going to talk about you and me, institutional research, and the Association for Institutional Research.

Can Institutional Research Make a Difference?

A salient fact about colleges and universities today is that the expectations they have held for the future have been grievously wounded. In the decades of the 60's and 70's, we, in higher education, dreamed no little dreams. It was the best of years for physical planners. Community colleges sprang up over the country. Junior colleges and extension centers became senior colleges, and senior colleges became universities. Degree programs proliferated. Research flourished.

This pyramid of higher education has now begun to erode near the top and on the windward side. The prestigious institutions and the privately supported colleges have been the more significantly affected, and nearly all institutions are sobered at their own prospects.

A second observation, made eloquently by Dr. Caruthers last night, and by Lyman Glenny at the 1971 Forum in Denver, is that those who have traditionally been responsbile for the leadership of colleges and universities are less and less able to exercise control over them. Harlan Cleveland, in his recent book, *The Future Executive*, contends that organizations are losing their hierarchial forms and that the organizations of the future "will be interlaced webs of tension in which control is loose, power diffused, and centers of decision plural." Surely, this is an apt description of the current situation in higher education governance.

Educational organizations with thwarted aspirations, increasing complexity, and with little control would appear to be less than ideal places to accomplish anything, but institutional research offices are found in such places — or so I'm told. Indeed, some institutions have established offices of institutional research because they have found themselves facing new and difficult problems. Perhaps the promise of institutional research is brighter, the darker the institutional prospect.

The question for us today is: can institutional research make a difference? Institutional research will not be spared from the general muster to accountability. My judgment is that we can demonstrate that institutional

research is making a significant impact in understanding *university management*, particularly fiscal management. However, the larger accountability of institutions to society is neither financial nor managerial accountability. That is the primary role of comptrollers, business officers, auditors, and examiners of accounts.

The institutions we serve are primarily accountable for the effectiveness of their educational programs. It follows that the activities of the faculty, in their aggregate, comprise the prime functions of the college or university in accomplishing this purpose. Increasingly, I fear, institutional research officers are seen by faculty as the resident Satanic apostle, emphasizing quantities rather than qualities, and efficiency rather than effectiveness. The existence of institutional research on some campuses has become an additional frustration to faculties.

The institutional research role is applicable to the entire university and its constituent programs. The Constitution of the Association reads that the major purposes of the Association shall be "to benefit, assist, and advance research leading to improved understanding, planning, and operation of institutions of higher education."

An institutional research officer should entertain the hypothesis that he or she can, by employing the tools and skills of his/her profession in a professionally competent way, contribute to the effectiveness of the faculty. In complex systems, control and direction are difficult to exercise. But institutional research officers understand systems, and it is this understanding that faculties need.

To assist in understanding the problem, consider for a moment the evolution of biological and social systems. The primitive unicellular protozoon, in its relatively simple organization and structure, performed all the essential biological functions — assimilating food, eleminating wastes, moving about, sensing its environment, reproducing, etc. As multicellular forms appeared, so did cellular specialization in function and differentiation in structure. In specializing, cells were able to do a more efficient job—of digestion, or movement or coordination—but in the process these specialized cells lost some ability to do other functions and thereby became increasingly dependent upon the multicellular system of which they were a part.

Similarly, primitive man as a social organism had a very generalized social function in the family or tribal structure, but gradually roles and skills began to differentiate. The social function of education eventually became a specialized role for some members of the culture. In turn, educational administration was differentiated from teaching, and in recent years, I.R. has become differentiated from educational administration and research. The first institutional research was apparently done by college presidents. Some of them still do I.R. as a not yet fully specialized and differentiated function.

There are several points to this illustration. First, we give up part of our freedom to make individual choices of a future when we become members of a corporate group, society, tribe, college, or university. Interdependency with its consequent loss of control by the individual was, and is, the price that is paid for more efficient production and higher living standards for the group.

Another indication from this brief look at the evolution of systems is that not all institutions have evolved to the same level of complexity and specialization. Some institutional research officers do give major attention to the educational programs of their institutions. If others of us find ourselves becoming specialized in management, it is time for another mitosis to occur so that the research function as it applies to effectiveness of teaching will not be lost.

Reviewing Progress

The higher purpose of institutional research is then to enable our institutions to continually review their progress, to project their *many* possible futures, and to select among these, those that are both desirable and realistic. There are many ways in which institutional research can fulfill this purpose.

Principally, I am speaking about education of the faculty to the corporate reality of higher education as a system. We recognize that we all retain significant emotional machinery that evolved in conditions where survival was at stake, and that this machinery responds to personal threat with an overpowering need to do something about it. This need has many of us running off in several directions at once. If there is to be an antidote to these individual "solutions" to higher education problems, institutional research must contribute to effective coordination and communication of the corporate purposes and goals of the institution and the means whereby the institution achieves these. I think this understanding is needed most severely today by the faculty. If, in our own sense of threat, we forget the threats perceived by others, especially the faculty, we have forgotten the unique role of institutional research in the institutional system.

The role of the Association has emerged from the role of institutional research in the institution. We need to come together on occasions such as this to learn from one another. But we also need to be self-conscious about the Association so that we can corporately influence the future of our profession and thereby our own. We have evolved to a significant level of complexity as an association and need to consider whether differentiation and specialization of functions should occur. We need more effective feedback mechanisms so we can develop a better information system on our members and their activities. We need to share this information among ourselves and consider its implications. What are the implications to us all, for example, that only about a third of our members give full time to institutional

research activities, or that only about 20% of our members come from junior and community colleges? How is the role of the Annual Forum changing, and how should it change? Should the Association develop a P.P.B.S. for its own planning and budgeting purposes?

The cobler's child goes unshod. Can the Association contribute to the number of possible career futures from which we as professionals may elect our own?

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HIGHER EDUCATION UNDER STEADY-STATE CONDITIONS

Allan M. Cartter, Carnegie Commission on Higher Education

If I had known there were so many people here with long memories, I would not have brought the same speech I used in 1965. Actually I remember that event very well. The Three Village Inn in Stony Brook isn't up to the standards of the Hotel Vancouver. It has lots of old world charm, but the thing I remember was that the room was very dark. I am terribly near-sighted and can hardly see my notes on the podium anyway, and they had a standing lamp over there with a 40-watt bulb in it. I spent the evening standing under the lamp, getting someone else to turn pages for me. I did not have time to write this one, so I will not have as much trouble with turning pages.

The other thing that happened was that I had not been to Stony Brook before. That's why I accepted that invitation. I fell in love with it and six months later I bought a summer house there, and for many years enjoyed going out and looking over their shoulder. I'd never been to Vancouver before until this invitation came, so I'm going to check with Bob Clark later about real estate in this city.

It is true that I tried out that evening in 1965 for the first time publically, the faculty supply and demand projections that I had been working on. I remember the last sentence of that speech. It was, "my advice to young faculty members or graduate students is that 1970 will be a good year by which to have achieved tenure." Both AIR and I have aged a little bit since that time, but that advice was still good, I think. I don't quite understand why I don't practice what I preach. Just two months ago I resigned my tenured professorship at NYU in Economics. It was after that meeting that some member of this Association sent me a little note with a quote from Sir Thomas Brown which read:

> Amuse not thyself about the riddles of future things. Study prophecies when they become histories. Eye well things past and present and let conjectural sagacities suffice for things to come.

There are times when I wish I had listened to Sir Thomas Brown's advice. But I think I'm the kind of frustrated institutional researcher myself. For the better part of ten years it was a kind of advocation — something that one did on nights and weekends. This year has been a kind of pleasurably traumatic experience for me for, partly on the Guggenheim Research Fellowship and partly by the Carnegie Commission on Higher Education. I now do from 8:00 a.m. to 5:00 p.m. what I used to do by lamplight. I hope my back east friends notice that on the west coast at 8 a.m. to 5 p.m. we work a 40-hour week not including lunch. I find in switching from night to day time, that research on higher education is rather different when you see it by daylight. There are certainly a lot more distractions, you don't squint quite as much, and when you get stymied on something you can always pick up the telephone and find an answer. You can't do that at one o'clock in the morning.

But even ominous projections aren't quite so depressing when you see them in the daylight. Last year I attended on OECD conference in Paris on university management and one of our French colleagues who was Rector of one of the universities was making a speech. They had simultaneous translations and suddenly the English-speaking community broke up with a roar of laughter which disrupted the meeting. We had to explain to the speaker what the difficulty was. The French translation into English came through as he was speaking about institutional research and budget analysis as "some people like to study futures, other people like to contemplate behinds." I want to suggest that that can be a kind of useful distinction. It's whether one's outlook is oriented to the past or to the future, and I would pose that an applied science such as Institutional Research, if it is really going to be effective, is of little value if it concentrates only on the past; if it does not provide some guidelines or guidance for the future. The corollary, of course, is, and my own experience well illustrates this, that no futurist is worth much if he isn't familiar with the past and does not try to test his projections of the future against the past experience.

My original battles and strong criticisms of the National Education Association's studies on the Office of Education in the mid 1960's were largely because they built models of the future that only a cursory analysis should have indicated would not predict the present by glancing back to the antecedent. I have made a lot of errors in projecting in looking at labor markets in the supply and demand relationships and I am embarrassed by a few things of mine in print, but it has almost always occurred because I have trusted the past too much, not too little. But in today's uncertain world I think all of us are looking more

and more searchingly into the future and we are having to speculate much more upon alternative courses of action. The presidents of universities and their trustees are increasingly asking us what effect there is going to be on the age, rank and tenure distribution depending on different faculty personnel policies; what the effect is going to be on enrollments of different tuition and scholarship policies; what is the voucher plan going to do to us; would the Yale contingent loan program help or hurt our situation; how is the changing ratio of men and women students going to affect curriculum, use of facilities, etc. So I think that all of us are being forced to look more into the future and to speculate more on alternatives. As I look to the future today, I think everything seems much murkier than it did five years ago.

Let me cite a few areas where I think the past is no longer a reliable prologue to the future.

College Enrolments

The obvious case is that of what's happening to college enrolments. As pessimistic as some critics felt my projections of faculty needs were when I did them in the mid 1960's, the situation now seems likely to be even worse than when one first looked at it. Most of you are familiar with parts of this evidence. Let me just quickly run through a few things that I think made it much more difficult today to look ahead. The demographic factor: the birthrates continue to decline in a rather frightening way and no one knows when the situation is going to stabilize. Last winter for the first time in history in the United States we dropped below the zero population growth fertility rate. When I started making these projections in 1964 and 1965, we were all forecasting the future based on Bureau of Census, Series 'B' population projections which indicated that by the end of this century we would have an 18-21 age group of almost 24 million people. In 1969, when I went back and took a new look at it, we were talking about Series 'D' projections, and instead of 24 million, it was only 19-1/2 million. In January, 1972, in another piece that I did, I had to shift to Series 'E' projections which looked as though they were going to be a little over 17 million college-age population by the end of the century. By June, 1972, when I reached the Carnegie Commission, Gus Hagstrum has done the projections there, and I went through again and we dropped down to something about 7 or 8 percent below Series 'E'. And just two months ago the Census Bureau finally brought out a new series 'F' which now predicts for the end of the century an 18-21 age group of 15-1/2 million. That's exactly the number we have in 1973. That's a very different kind of future than it looked as though we could contemplate 7 or 8 years ago. So over the next few years, up to about 1980, the college age group is going to grow by about 1-1/3 million in the States. By 1988, however, it will have dropped 2.9 million down to about 14 million persons. I noticed in the New York Times on Tuesday that Arthur Campbell in the Population Research Center of NIH was quoted as predicting a turn-around in fertility rates very shortly, believing that the dramatic change in the last three years is largely the result of postponing having children rather than not having them at all, but that's no help to us before 1995. So certainly as one looks to the demographic factors, things look much grimmer for those of us who are in the business of selling educational services that it did when we looked at it in the middle or late 1960's.

High School Completions

A second factor equally important is what's happening to high school completions. All of my enrolment projections and most others that I have seen recently are based on the assumption that there is going to be a continuing increase in the proportion of the age group that graduates from high school. In my projections I have built in a 1% point per year annual rise from about 78% at the present time up to about 90% in the early 1980's. Now it appears from recent figures that in 1970 there was only a .2 of 1% increase and in 1971 high school graduates dropped about 1%, so the pool of potential students is already about 4% below the estimates I and the Office of Education and others made only three years ago. I have not the foggiest idea of where we are going in high school experience; everyone seems to be puzzled by this reversal.

The third factor is what's happening to college enrolment rates, and again two months ago, the Census Bureau came out with a report which I am sure all of you saw, that the proportion of 18-19-year-old males in college dropped from 44% in 1969 to 37.6% in 1972. For the 20-21-year-olds, it went from 44.7% down to 36%. In the case of women the 18-19-year-olds remained constant, 20-21-year-olds went up by about one percentage point. But at least the proportion of the age group going to college in 1972 is now about 4 percentage points below what it was in 1969. I had assumed in my projections, it would rise about 2-1/2% in that period. The O.E. projections have built in about 3% rise, so we are far off the target in college enrolments.

The fourth factor, somewhat related, or at least additional evidence, that while the percentage in college may have dropped, the question is what's happening to absolute numbers. The Office of Education this year has done a hand tally of Fall 1972 enrolments and now we find that first-time enrolment in degree credit courses was down 1.4% for the United States in fall 1972 from the year before. There was a healthy increase in non-degree enrolments, but not enough to really make up for that. First-year graduate enrolments in fall 1972 increased by only .06%. They had been going up 5 to 10% a year. So looking towards the next 5 to 10 years, one could, on the basis of these somewhat

shaky factors of the last two or three years, if you tried to contemplate the worst, the high school graduates and college attendance rates would plateau out at their present levels and the graduate enrolments would stabilize — if all of that happened, then all we could look forward to is about an 8% increase in enrolments during the rest of the 1970's and then, of course, a contraction fairly sharply in the 1980's. If you compare this with the Office of Education projections that full-time equivalent enrolment will go up by, I think, it's 51% in the 1970's, or even the Carnegie Commission assumptions that would rise by between 40 and 45 percent, you can see that one can be very seriously shaken by this.

How much substance one should give to the events of 1970 to 1972 I don't know. The change in the draft status in Vietnam and temporary recession, unemployment, these may all just be very temporary things, but I think most of those who are watching these barometers rather carefully are rather seriously shaken by it. Anyway, if in fact enrolments only went up by 8 to 10% over the rest of this decade even my most pessimistic projections of the demand for college faculty would look unrecognizably rosy by comparison with the facts.

Let me look very briefly at the supply side of the academic labor market. Again, the rate of growth in Ph.D. output has been declining fairly sharply. The first-year graduate enrolments as a percentage of baccalaureate degrees granted in the preceeding year actually peaked for men in 1966 and has dropped about 20% since then. For women that percentage of B.A.'s going on to graduate work peaked in 1968 and has dropped about 6% since then. If you also look at the ratio of Ph.D.'s granted to first-year, first-time enrolments in graduate school, on the average about five years earlier, you find that factor peaked for men about 1970 and is now dropping fairly substantially. For women is seems to have stablilized the last two or three years — that's in effect a kind of completion rate of doctoral studies. Our latest estimates at the Carnegie Commission are that the 1972 Ph.D.'s, who numbered about 34,000, that the number will grow the somewhere around 42 or 43 thousand by 1980. That compares with the last published O.E. projections of something like 68,700 so there is some sharp adjustment going on on the supply side of the market, too. In some fields the reversals are very dramatic. Physics is probably the best documented. In the case of physics the percentage of freshmen who major in physics in college has dropped from 1.8% of all freshmen in 1960 to .6% in 1972. So their share of the market has declined down only 1/3 of what it was 12 years ago. The first-year graduate students, in comparison with a number of junior majors two years before — that is more-or-less the percentage that go on to do graduate work — has dropped from a high of 46% in the late 60's now down to 30%, and the number of Ph.D.'s granted in physics, since there are enough time lags built into the system, hit its high point this last June at about 1,600. It looks as though it is going to be down to only slightly over 800 by about 1977 or '78. So there are some fields that are adjusting very rapidly to the change in job market conditions. There are other fields where it seems to be happening in the reverse fashion. The most perverse usually turns out to be in the field of education where for some strange reason I guess the tougher the job market gets, the more important it seems to go on to get one more degree to try and protect your position in your career.

Employment of Ph.D.'s

But strange things have been happening in the employment market of Ph.D.'s. So strange, but again although I have spent a part of this year trying to look at it, I don't know how to decipher it. Over the last five years the number of Ph.D.'s taking academic teaching positions, even during this period when we talked about the tough job markets, the number taking teaching positions in higher education has gone up forty percent. Two factors seem to account for this.

One is an increase in the percentage of new faculty hired who already have the Ph.D. Institutions are hiring many fewer who have lesser terminal degrees. The second factor is that there is much more filtering down going on as Ph.D.'s now turn up much more frequently in institutions of somewhat lesser repute. There are several interesting studies that have been done by John Nyland that are very revealing on this. Comparing 1968 to 1971, he did a study using the infamous Carter ratings trying to see what proportion of Ph.D.'s in various fields took their first teaching appointment in an institution that was of equal or of higher quality than the one from which they got their Ph.D. So if you got your degree from Harvard you had to be hired by Harvard or you didn't fall into that figure. In the field of economics in 1968, 20% of the new Ph.D.'s moved on to teaching jobs in institutions as good as the ones where they got their degree; 1971 it was down to 6%. In mathematics it dropped from 29% to 9%; in geography from 25% to 4%, and the overall figures were 19% and 8%. So there is a very sharp change in the pattern of types of jobs that new Ph.D.'s are taking when they finish their graduate training. Obviously there is a bumping process going on and Ph.D.'s are bumping people with lesser degrees or masters degrees or whatever in some of the state colleges and junior colleges.

Even more puzzling to me are the reports of the National Research Council that the number of new Ph.D.'s taking appointments in the academic sector as post-docs has actually gone up by 60% in the last five years. In this same period the number of post-doctoral fellowships and traineeship awards has declined markedly, and yet

somehow these people turn up as post-docs in the major universities. What appears to be happening is a kind of holding pattern that developed in a lot of the major universities and they tend increasingly, now, to be hanging on to their new Ph.D.'s if they don't find other attractive employment immediately, and plugging them into ongoing research jobs in their own institution. In this way, they are sort of bumping what used to be the graduate student R.A. and to some extent, even the teaching assistants. I find at Berkley, in some fields, they are even splitting post-doctoral appointments now. In Particle Physics most of the post-docs are offered 50% appointments at $5500 or whatever instead of full time at $11,000, so increasingly there is a kind of holding pattern that has developed over the last two or three years. But I think it's fairly obvious that this can only be a temporary phenomena. You can't go on enlarging that reservoir continually; you can do it for a short period of time largely at the expense of support of graduate students in the department. My personal belief is that the academic labor market situation is going to get slowly but progressively worse in most fields — less so in those which are quickly adjusted such as physics — and the problem would be less acute obviously in those fields where there is a fair amount of traditional employment in government and industry or in the scientific fields, where I think employment prospects have to rise again in the next several years. The really gloomy period, however, has never seemed to me to be the 1970's; it's always looked to be in the 1980's. So in one sense perhaps we should be thankful that the budget constraints of the early 1970's have given us a lot of forewarning and that at least some adjustments now are taking place within the system.

Steady-state Conditions

This, looking from another point of view, poses a kind of institutional problem that I suspect many of you are also wrestling with and that is, how do we live in a world that's more akin to that of a stationary state without getting top-heavy in our faculty age and rank distribution. We have been playing with building models of the Carnegie Commission, faculty-flow models, trying to see what was going to happen if nothing else changes in the situation, but these enrolment adjustments that we can see coming and what's going to happen to faculty hiring and the faculty age and rank distribution. In 1970, 51% of college teachers were under the age of 40 and as we follow this model through, assuming everything else remains the same, the relative salaries and retirements, that figure will drop from 51% to 18% by 1990. If we have problems now with generation gap you can see what it will be 20 years from now. In fact, the biggest shock of my life is finding out that 78-1/2% of all college teachers are younger than I am. That did more to make me feel ancient than anything I have ever done. Because there are so few faculty members, relatively, at the present time who are over age 50, it means that the impact of expansion of the last 10 and the next few years, means that the combined mortality and retirement rates of faculty, if there are no changes in retirement policies, which added up to about 1.6% of the faculty either died or retired in 1970 — that factor actually is going to drop to about 1.2% in 1985. So there is very little relief one can see until one gets almost to the turn of the century in terms of much higher retirement rates. I started out about two years ago when I was getting alarmed by this to talk about lowering the common age retirement for faculty members. In fact, I think my last act at New York University before leaving was to drop the retirement age from 68 down to 65. Then I got out of town the next week! I have now come to the conclusion that really doesn't have much impact on the total system. It may help the individual institution but very little relief would occur from merely lowering the retirement age. Obviously that drop from 51% to 18% of the faculty that are under age 40 is not going to work that way; the market will make some adjustments. There are some changes taking place in tenure policy, some changes in retirement policy, there are going to be some adjustments in relative salaries between academic and non-academic employment and the situation is going to be a little fluid. But it's interesting to try to built your first model and see what would happen if nothing else changed. Now we are going back, and trying to see what happens if you build in various assumptions on these adjustments.

Let me turn briefly to two other areas where the past provides very few clues for the future. I believe that in the last several years there are many signs indicating that public policy is beginning to shift around more and more to the view that one should support students rather than just institutions. The imposition of tuition at the University of California in 1970 may have signalled the beginning of this. The higher education amendments in 1972, I think, if one analyzes them carefully, are a clear indication that Federal policy is shifting in this direction and when Bob Kibbee throws in the towel, then we will really know it's a trend. Every year the city university is threatened with moving to a tuition fee; they have not done so yet. The forthcoming Carnegie Commission report, due out at the end of June, is going to urge a narrowing of the tuition gap over the next decade, the gap between public and private institutions plus a substantial increase in financial aids to students. I gather there is a Committee on Economic Development report that's going to be out very shortly with somewhat similar types of recommendations and there are many state reports like the Governor's task force in New York that have come up with recommendations of that sort. Increasingly, it seems to me this is becoming more and more the fairly common popular view as the direction in which we should go. It is seen as a way to provide adequate resources to make universal access to higher education a

reality while at the same time trying to preserve diversity of institutions. The California State Scholarship Commission in its study of how college students pay for the financing of higher education done in 1972 is indicative in this regard. We at the Carnegie Commission have combined some of the California data with our estimates of institutional subsidies and have come up with the following estimates.

In the public sector — that's taking the two-year and four-year colleges all together — the students and families in the highest income group (that's $18,000 and over in the State Scholarship Commission study), students and families in that highest income group contributed only 51% of the total monetary outlay as we have defined it, which is all of the institutional costs of education, the subsistence cost of the student minus whatever student aid they had. So 51% was contributed from those in the highest income group. Students and families in the lowest income group contributed 35%. In the private sector, those percentages are 54% and 31%. Bit there seems to be increasing pressure, I think, to try to create somewhat greater equity and many people argue that there ought to be greater disparity between them. Perhaps those in the highest group ought to move to 65 or 75% contribution and those in the lowest income group, if we are really going to do away with the financial obstacles to attendance, ought to drop down to 15% or 10%. But I believe there is increasing opinion that public subsidies need to be redirected to be of greater assistance to the low and lower middle groups. I think that is going to make a considerable change in the 1970's on many of us.

A Learning Society

Finally, let me turn to one other area which is rapidly becoming part of the public consciousness and could have a marked impact. Over the past decade we have seen a change in nomenclature for education to persons beyond the normal college age. We have spoken of adult education, which became continuing education, and now increasingly you hear comments about recurrent education, the life-time learning society, etc. I think it's more than just words. The new civil rights emphasis in this country, I think, has given us somewhat greater concern for adults who missed out when they were 18 to 21 and never did get any advantage of post-secondary education and most particularly so when you look at studies like that of Bob Hartman at the Brookings Institution that indicates that 40% of the public subsidies that go to higher education are paid for in taxes by people who are non-attenders — that is, who did not get any benefit directly from it. Similarly, somewhat in the civil rights vein, the increasing re-entry of older women to the labor force, many of them wanting to go back and get refresher courses or to complete education. In addition to that, the rising problems of technological obsolescence is making us more aware of the need for retraining at various times in one's life. The manpower training problems that have emerged because of the rise and fall of industries like aerospace, the increasing practice of young people of stopping out in higher education and then at 25 or 30 wanting to come back to complete — all of these things are contributing to a new awareness and a new kind of demand for higher education on the part of adults. Last year the OECD held a very interesting conference on new patterns of life in adult years. The chief argument was that study, work, and leisure all ought to be seen as part of a continuum and that separating out financing retirements one way, and education in another way, didn't make much sense. The recommendations for the OECD member countries were that they ought to explore moving to some kind of common social insurance program which would recognize that there are trade-offs between lifetime education, periods of leisure, adjustments in retirement age, etc. The International Labour Organization is holding a big conference in Geneva this summer on the subject of paid educational leaves. The new programs introduced within the last two years in France and West Germany have suddenly stimulated a great deal of interest. There is rising interest among the trade unions in this country and it's quite possible that this will bring more and more awareness and more and more pressures for doing something to help finance other than traditional 18-21 education. The Commission on Non-traditional Studies, the report of the new Commission on Continuing Education that Father Hesburg chaired, the report due in August or September by the Carnegie Commission, all of these things are adding much more interest and much more concern with the factor.

The likely next major development, I think, is devising some type of contributory plan to finance adult education. If so, it could revolutionize the educational structure of higher education. At the present time only about 25% of these activities take place in what we think of as colleges or universities. A lot of it is out in civic organizations and proprietary schools, etc.

I have catalogued a number of areas which many of you either now do or will shortly deal with in one respect or another. They are all areas in which guidelines seem unclear at the present time and where extrapolation is inadequate. It makes the job more challenging if more difficult. The only thing I think that we know for certain today, and perhaps we should be thankful for this one thing, is that famous punch line of the comedian Mort Sahl, "the future lies ahead."

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THE HAZARDS OF PLANNING — PREDICTING PUBLIC POLICY

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For those of us who have watched with alarm and bewilderment the shifting breezes of Federal involvement in education during the past decade, the juxtaposition of the words planning and public policy in the same sentence approximates a contradiction in terms. Yet both public interest and the public investment in higher education have been growing rapidly, facts which by themselves force us to deal seriously with this topic.

Predicting public policy as it relates to or affects higher education is not a pursuit which many educators have mastered, in fact it is not something to which many of us have given much thought. But since we must think about it now and in the future it behooves us to do so in some structured way and hopefully with as much information and analyses as we can muster.

What I intend to say on this topic today is not intended to provide you with either a method or a model with which to approach this task. Rather I shall attempt to demonstrate the influence of public policy in four broad areas of institutional concern and to suggest how they will affect radically the operation of colleges and universities in the future. Much of what I shall refer to could have been predicted by people assigned to systematically scan the political horizons even though my own awareness of them I readily attribute to hindsight rather than foresight.

Given the importance of public policy to the operation of colleges and universities in the future (which I hope to demonstrate) the syllogism is easily constructed by which predicting public policy becomes essential to sound planning and thereby a matter of concern to those represented here this morning.

For purposes of this discussion I am defining public policy to mean any consensus of ideas and attitudes which has been converted into an operational principle through legislation, administrative regulations or court decisions. From this it can be readily recognized that public policy may be something different from popular belief and that it can operate at several political levels. Individual states or even localities can establish policies that at the time are not widely accepted. Some of the issues I shall discuss are not yet broad national policies although I am convinced that they soon will be.

Let me begin by saying a few words about the reasons for the increasing application of public policy to higher education. The litany is familiar to most of you but it serves to provide a proper context for what follows.

Growth

The reason for the growing interest in higher education is not difficult to understand. It is a function of its size, its pervasiveness, and its cost. In what is really little more than one generation, higher education has projected itself into the mainstream of our domestic concerns largely through its phenomenal growth. In the United States better than six out of ten high school graduates now go on to college and the percentage is still growing. This means that today virtually every family has had some immediate experience with college either directly or through the activities of someone close to them. Today our colleges and universities enroll about 9 million students, employ nearly one million professionals and an almost equal number of non-professionals. Total expenditures for higher education now exceed 30 billion dollars annually, roughly two-thirds of which are tax dollars. Thus there is a high level of interest in higher education because it touches virtually everyone either in their personal family lives or in their pocketbooks — two of the most sensitive of all human nerve endings.

The corollary to this growth is more subtle but in the long run, will be more significant and brings me to the first area of public policy I wish to discuss.

A generation ago when I was in college no more than one high school graduate out of seven went on to college and a much smaller percentage of those who entered high school graduated than do today. Thus the percentage of college graduates in the total cohort of young men 21 - 25 at the beginning of the second world war was very small, indeed. Except for the major professions such as law and medicine it was quite possible, even probable, that young people without a college education could make it into the mainstream of the nation's economic life and rise through it as far as their talents would take them. Not so today, and even less so tomorrow. As the percentage of those with some college education rises to be a major fraction of their

age group, college becomes a giant sieve through which society sorts out those who can succeed from those who must accept what is left. When this happens, and it is already happening, the opportunity to attend college is no longer a luxury but a necessity and when it is a necessity it will rapidly become a right. The growing demands of minorities for an opportunity to attend college is based at least in part upon their perception of a selection process based upon the college experience. These demands will grow as the noose tightens.

This seems to be an appropriate point at which to suggest a few principles to reflect upon.

The first principle is that the ability to exclude people from an opportunity in our society is in inverse proportion to the percentage of the population that is included and to the importance of that opportunity to participation in future benefits of the society.

The second principle is that the ability to exclude people from a benefit of our society is in inverse proportion to the public tax dollars invested in providing that benefit.

These are hardly in a class with Newton's Laws but I believe they state with some accuracy what has already begun to happen in higher education and to what I believe will happen at an accelerated pace in the future.

Continued Expansion

The proliferation of community colleges throughout the nation, the growing attacks upon the traditional admissions processes at colleges and universities; the initiation and expansion of state scholarship programs and the "open admissions" policy adopted at my own institution are all, in whole or in part, reflections of the operations of these principles. I cannot imagine that the pressure will subside. Those who must predict what the future holds would do well to consider the probabilities of universally available higher education and how such a public policy might affect their institution. Even private institutions which might too readily relegate the implementation of such a policy to others should pause to reflect on the real possibility that to the extent that they do or might receive public subsidy they may be expected to participate in the solution of this public problem.

It also seems safe to predict that within a relatively short time the loose relationships that have characterized the internal operations of the campus are going to become increasingly formalized. This is a euphemistic way of saying that the relationships among the several elements of the college campus are rapidly going to be governed by union agreements arrived at through collective bargaining. Although many may wish to debate whether this is good or bad, I find such a discussion, if you will pardon a pun, academic. The movement has started, it is growing and it will not be stopped. Those who think it evil may resist it, those who find it sensible may embrace it but in the long run it will come and we will learn to live with it.

On many campuses today, large segments of our non-professional employees are unionized and the number increases daily. Within the last few years the NLRB has proclaimed its jurisdiction over large and middle-sized colleges and universities and each year state legislatures are extending to teachers the right to collective bargaining and even the right to strike. Today faculties at about ten percent of higher education institutions in the United States are represented by a recognized bargaining agent. By the time a new decade dawns, I feel certain that virtually all public institutions and most large private institutions will be dealing with faculty unions of one sort or another. But it will not end there. The movement will be slower in developing but within the time span we are talking about students will be in this game too. It is highly unlikely that they will acquiesce for long to being whipsawed between the demands of the faculty and the desires of the administration. The era of effective student unions is at least within sight.

As the formalization of relationships develops it will raise many questions about traditional educational practices that will have to be resolved. Among these are the role of the faculty in curriculum development, methods of selecting, evaluating and promoting faculty, the whole question of tenure and a host of other matters that have been part of the mythology of higher education.

Moreover, it will alter significantly the staffing requirements of institutions, record keeping, hiring procedures and legal services, all of which will affect the allocation of resources.

A New Accountability

This brings us to our third point. In our recent history no matter of public policy has affected us more directly or more pervasively than in the area of personal human rights. It is true that we are participating in this instance in a major national, if not international, phenomenon. But it is significant that previously held exemptions are being withdrawn gradually from colleges and universities either by legislative action or judicial mandates.

We are, of course, most familiar with the anti-discrimination edicts and the affirmative action programs of the Federal government but in many areas the surveillance of human rights is multi-leveled. The City University of New York, for example, in addition to satisfying Federal requirement may be challenged through the union grievance procedures, the City Human Rights Commission and the State Division of Human Rights. Moreover, any individual may take his complaint to each of these tribunals consecutively or to several of them concurrently. The implications of this for university operations can be readily imagined.

But those aspects of human rights which are related to discrimination are only part of the picture. Recent court decisions have ranged over a much broader canvas including due process in the handling of disciplinary cases of both students and faculty, proper procedures for faculty appointments and non-reappointments, residency requirements for students and the control of student publications. These decisions have, in effect, applied general public policy to campus operations and in the process significantly altered traditional relationships and operational methods. I am certain that we can expect this trend to continue both by expanding constraints on areas already touched and by taking up operational areas not yet affected. Surely the possible effects of this process cannot be excluded from our planning if we are at all concerned about future reality.

My final example and one which relates most directly to the size and cost of higher education, I shall try to encompass with the general term "accountability." In one sense the concept of accountability transcends the general area of public policy since it has captured the imagination not only of legislators and governors but of the many non-public benefactors of our institutions including foundations, alumni, corporations and even students and their parents.

For years all educational institutions have been aware of the necessity for fiscal accountability in the sense that they have been required to assure their constituents through independent audits that money received was properly accounted for. Many public institutions have for years been subjected to varieties of pre-audits of expenditures which have often promoted the green eyeshade denizens of budget offices to faculty-like status. In more recent times many public institutions have had to justify both new buildings and additional staffing requests by extensive analyses of space utilization and class size. And, of course, in virtually all institutions, the administration and faculty have always been accountable to their trustees.

But I am speaking here of a different kind of accountability. It can translate ultimately into the simple concept of "more bang for the buck" and reflects a concern for both the efficiency and the effectiveness of the educational enterprise. Discussions of the new concept of accountability are peppered with terms borrowed from industrial management-productiviy-cost-benefit-and so forth but the meaning is clear. The various supporting constituencies of higher education are concerned about both the process and the product. The reality of this concern cannot be judged by the vagueness of the solutions that are being suggested.

Unfortunately, we are woefully unprepared to respond to these concerns in terms that are convincing. The product of the educational process is elusive enough in itself. When one tries to measure the value-added through education the task appears staggering. Yet if we are unwilling to try to frame the discussion in our own terms there are others who will do it for us, probably in ways that are less than satisfactory.

Since efficiency is always easier to measure than effectiveness I fear that those outside the academy will settle for measures of quantity rather than of quality and will focus on teaching rather than on learning. If we are to move the discussion to a different plane we must move rapidly to address these questions in our own house.

It is clear to me from these and other less obvious manifestations that questions of public policy are impinging with accelerating frequency and with greater pervasiveness on our colleges and universities. The few instances that I have mentioned here this morning have already had a profound effect upon the operations of some institutions and, I believe, will spread to all or almost all before this decade is done.

Changing Public Policy

New thrusts undoubtedly lurk on the horizon and will soon be upon us. Moreover, we have ample evidence that public policy does change and we suspect that analyses would show us that certain kinds of public policies shift more rapidly than others.

As we plan for the future it is essential that we attempt to factor this increasingly important consideration into our future thinking. How we go about this process is extremely important and those of your who are here today have a vital role to play in that process.

I have recently read a small monograph which detailed the planning dynamics of a major university over a period of almost ten years. Since I am fairly familiar with both the institution, the individuals involved and the milieu in which the planning too place, I have reflected a good deal on what I read. I have concluded that given the normal planning process some very intelligent men devised a program based on decisions which at the time they made them were almost uniformly correct. Unfortunately, they had assumed that the world they were operating in would be the same tomorrow as it was today but more so. The world changed and many of the correct decisions became disastrously wrong. A large element of the difficulty arose from changes in public policy. Whether or not the shifts in public policy might have been perceived had this aspect of the environment undergone careful scrutiny one will never know. The fact is that it was not done and that the decisions were made in the kind of unsuspecting euphoria that grips small investors in the stock market just before the bears take over.

Since I have proposed here that public policy is an important ingredient in the planning process, that it will

become increasingly important in the future and that, therefore, it is essential that we make an effort to predict what that policy is likely to be, it seems only fair that I say a few words about how this might be done.

Most obvious is the necessity that if any systematic effort is to be made it must be somebody's resonsibility to do it. The Office of Institutional Research or the Office of Planning seem logical candidates for this assignment. There are several places where one might start. Since public policy tends to change slowly and grows through an accumulation of individual instances, it might be well to follow carefully the literature of higher education to perceive which ideas seem to develop a following. The annual reports of foundations, particularly the larger ones, are another source of information not only for what they say but for an analysis of those ideas or concerns which attract support. Certainly some way of monitoring the public policy decisions that are made in those states which tend to be in the forefront of educational change will suggest clues to what might become general policy in the future. The public statements of governmental officials — governor, legislators, agency heads are another source of useful information, particularly if one is alert to ideas that tend to reoccur with increasing frequency. Court decisions affecting higher education are already monitored by scholars who have identified trends that might usefully be considered by those who must plan for the future.

What we are talking about is a form of educational intelligence work that gleans information from many sources, evaluates it, pieces it together into a meaningful mosaic and attempts to determine how it might affect what one wishes to do in the future. It is not an exact science but rather the application of analytic intelligence to information. The process does not guarantee sound decisions but it does insure that a vitally important component of future planning will be consciously addressed.

Planning is both an essential and a hazardous undertaking. Predicting the future we have left largely to astrologers and mystics. But if planning is to be more than wishing we must make an effort to predict what the world will be like. If predicting is to be more than guessing we must do it as carefully and as systematically as we can.

I wish you luck.

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PROGRAM EVALUATION: APPROACHES AND PROCEDURES

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There is an increasing concern with program evaluation in higher education. This concern stems from a demand for new academic program to meet the changing needs of college students and from an insistence that programs be properly managed and systematically judged.

The Carnegie Commission on Higher Education (1972) has issued a strong appeal for the development of academic programs that would serve the needs of students who have not traditionally sought higher education and whose motives and interests differ greatly from previous students. The clear implication of that appeal is that students are changing and academic programs must be changed accordingly. The Commission on Nontraditional Study (1973) makes an even stronger appeal for academic programs that would serve students rather than institutions, permit a degree of flexibility and an adaptiveness that has often been advocated but seldom realized, and help realize a total learning society that would place no limits on the efforts of its citizens to acquire the skills and knowledge they seek.

Other converging events that spur the concern with program evaluation are the federal legislation of the sixties that made specific requirements for evaluation and the current dominance of economic and engineering concepts in educational thought and discussion. The Elementary and Secondary Education Act of 1965 (ESEA) gave an impetus to evaluation that may indeed have a greater impact on education than the act itself. The allocation of massive sums for the improvement of education did carry a mandate for insuring that the money was well spent. The ensuing disillusionment with the massive programs funded by ESEA underscored the need for better methods, skills, and techniques for the evaluation of educational programs. To quote Malcolm Provus:

> Perhaps before we can build effective new programs, we must establish creative new ways to monitor and eventually judge the effectiveness of such programs. This capacity to evaluate programs must ultimately depend upon a management theory that utilizes pertinent, reliable information as the basis for administrative decisions (1969, p. 243).

The dominance of economic and engineering concepts has emphasized the shift of conceptual focus from input and process variables to an assessment of educational outcomes. The overplayed theme of accountability is based on a concern with efficiency in the utilization of personnel, resources, and materials in the educational enterprise. As much as educators may disclaim the appropriateness of economic and engineering concepts for academic programs, they should be nonetheless cognizant that such concepts are the dominant ones at the present time.

The purpose of this paper is to examine the current approaches that are being made to program evaluation and to consider some of the implications for academic programs in higher education. The effort is predicated on the basis that program evaluation is a management imperative for higher education and vitally affects the role and function of institutional research in our colleges and universities. The evaluation of academic programs in the past has not been viewed within the larger framework of policy analysis and has not been a major concern of institutional research as such. Not only have past efforts been spasmodic and piecemeal, but the evaluation of academic programs has not been well grounded and has often produced results that conclict with professional experience and judgment. The Coleman Report (1966), the study by the RAND Corporation for the President's Commission on School Finance (1972), and the much publicized Jencks study (1972) are indicative of an increasingly persuasive argument that runs counter to our better hopes and expectations for education. In brief, these studies raise a number of critical questions for public education as it is traditionally valued in American society. They leave us wondering most seriously where the difficulty lies — in the educational programs as implied, in the methodology of evaluation as it is imperfectly developed, or in the choice of criteria as they are opportunistically employed. The serious implications of such studies strongly suggest that they cannot be easily ignored — and they cannot be accepted at face value.

The dilemma posed by the numerous efforts at program evaluation in the past several years is, to say the least, embarassing. It would seem most advisable then to examine recent trends in program evaluation, to understand carefully the conceptual and methodological difficulties that are involved, and to seek a better conceptual grasp of

the nature and functions of evaluation in general.

Recent Trends in Educational Evaluation

There is a well-known but highly embarrassing suspicion that most efforts to evaluate human productivity, effectiveness, or well-being wind up on a pessimistic note. This is true not only of programs in education but also of evaluative efforts in the fields of social welfare, penal corrections, public health, counseling, psychotherapy, rehabilitation, public housing, and religious conversion. When traditional methods of experimental or quasi-experimental investigation have been applied to the problems of human betterment, correction, enlightenment, or uplift, the results have not been as encouraging as proponents of the program, technique, procedure, cure, or remedy had hoped in the beginning. Whatever human nature is, it does not appear as malleable, flexible, or plastic as reformers, revivalists, and crusaders proclaim. Change in human behavior is not easily assessed in systematic, quantitative, or experimental fashion and an inherent resistance to change has been postulated more than once to avoid the full pessimism of research findings.

Perhaps the encouraging feature of the most recent wave of pessimism is the growing recognition that the scientific methods developed for investigation of physical and biological phenomena in a laboratory setting are not adequate for the evaluation of programs seeking to improve, correct, or benefit human beings. It is not the wrongness of scientific method that is underscored by this outlook but rather the limitations of narrowly construed methods in dealing with social, cultural, and psychological complexities.

A changing Notion of Evaluation

As in so many other changing trends in education, the National Society for the Study of Education was quick to address one of its yearbooks to a consideration of the issue and problems involved. Edited by Ralph Tyler (1969) the 1969 yearbook addresses itself to the changes taking place in educational evaluation. New needs, conditions, knowledge, and techniques are said to foster new concepts, procedures, and instruments of evaluation. Massive financial support was first given by the federal government to the development of new courses in science and mathematics, then to the social problems of poverty and discrimination. Each produced in turn a demand for sound data that would guide public decision and policy. Coupled with the rapid increase in technological instrumentation, federal support of education spurred a concern for evaluation that could not be met by traditional test theory and practices. An adequate appraisal of new conditions and the application of new knowledge about education as such was believed to necessitate new developments in evaluation.

Merwin (1969) emphasized that change had been prevalent in educational evaluation since its inception in the 19th century but changing concepts of evaluation were called for by the new educational efforts and technical developments. Bloom (1969) found one of the major theoretical issues of evaluation to be the degree of specification of educational objectives and outcomes. The basic problem is making the desired outcomes of learning sufficiently explicit for communication to teachers, technicians, students, and the evaluators themselves. There is also the problem of evaluating the non-specified outcomes of instruction, judging the effect of evaluation on the learning process itself, and then assessing the usage of evaluation results. He posits that evaluation is more likely to have effect when (1) important and relatively stable characteristics are measured, (2) the data are used for important decisions and major disjunctions, (3) the results become part of the public record, and (4) they are used to judge the effectiveness of teachers, schools, or school systems.

Stake and Denny (1969) make the cogent observation that evaluation is not "a search for cause and effect, an inventory of present status, or a prediction of future success (p. 370)." It is something of all three but only if it contributes to understanding substance, function, and worth. Evaluation may have many purposes but should always attempt "to describe something and to indicate its perceived merits and shortcomings." They also point out that the successful application of evaluation methodology is dependent upon people and that one of the most urgent needs is for more effective recruitment and training of evaluators. This need is not supplied by graduate programs in tests-and-measurements or in research-design-and-analysis. To realize the potential of evaluation, different concepts and techniques are needed. Other needs are better means of representing educational goals and priorities, reliable techniques for assessing instruction and learning materials, and simple instruments for gathering opinions and value judgments. Needed most is the development of formal procedures for processing evaluative information and drawing inferences that warrant the confidence that is placed in them.

A Sharpening Focus

The American Educational Research Association's recurrent interest in educational evaluation is indicated by the April 1970 issue of *Review of Educational Research* and the monograph series it has launched on the subject of curriculum evaluation. The growing concern for evaluation theory, research, and practice is reflected quite strongly in the issue of RER and several of the conceptual shifts in role of evaluation are pinpointed quite well. Cohen (1970) stressed the radical change in the purpose of evaluation as the result of the national thrust against poverty and dis-

crimination. The large-scale programs of the federal government meant that educators were now involved in social action programs and not merely education as they were accustomed to it. This meant further that the whole business of evaluation research had been thrusted in the politics. This turn of events was a source of confusion to many educators who were not prepared for the shift in national goals and expectations.

The AERA Committee on Curriculum Evaluation was established in 1965 and commissioned to develop guidelines for the development and revision of educational curricula. The Committee has proceeded on the belief that contemporary testing and measurement procedures are inadequate and that special observation, data-gathering, and decision-making techniques are required. To encourage the development of a more adequate theory and rationale for the use of such techniques, the Committee has issued several monographs in the series that open up discussion in a commendable fashion.

Scriven's (1967) distinction between formative and summative evaluation has been widely adopted. He describes the former as the efforts of educators to improve curricula during their development and the latter as the final or conclusive evaluation that would be made after termination of a course, program, or project. Formative evaluation is, of course, intermediate in the sense that it permits adjustments, modifications, and improvements while the program or project is still in a state of development. The focus is on deficiencies and weaknesses that should be eliminated or on strengths that should be emphasized. In summative evaluation the focus is on judgments or over-all conclusions that would assess the terminal worth or value of the program. The finality or conclusiveness of the evaluation is, needless to say, still a matter of relative degree but the implication is that summative evaluation borders on the final word that may be had on the subject under investigation.

Scriven's notion of formative and summative evaluation is comparaole in many ways to the distinctions that Cronbach and Suppes (1969) made elsewhere between decision-oriented and conclusion-oriented research. Traditional methods of science are said by the latter to be directed to the derivation of general conclusions and not to the solution of immediate or practical problems. Conclusion-oriented research is directed by the researcher's own commitments and intellectual interests. He raises questions as the research proceeds and is expected to follow leads that may prove more promising than his initial or primary hypothesis. It is expected that his final results will contribute to the large body of scientific knowledge in the particular area in which he is working.

Decision-oriented research is conducted for the specific purpose of facilitating decisions that must be made in the immediate future. The purpose of the research is not determined so much by the researcher's interests and commitments as it is by the needs and dictates of persons administratively responsible for the decision. Time constraints and other restrictions are placed on the researcher's efforts and he is not free to follow up side-leads or by-paths that might prove more interesting than his original charge. When the research is completed, the researcher may or may not be free to publish his findings in a scientific or professional journal. His audience will more likely be the administrative, legislative, or public authority for which he did the research and his responsibility will not be limited to publication of his research findings. To the contrary, he may spend months explaining his findings to groups of critics, adversaries, and others who view his research findings with suspicion, if not outright hostility.

Evaluation and Decision Making

The most ambitious approach to program evaluation has been made by the Phi Delta Kappa Study Committee on Evaluation (1971). This Committee makes a direct attack on the notion that evaluation is "a healthy science, operating from a base of well-established theory and methodology, and with obvious benefit for all (p. 314)." Evaluation is defined by the Committee as "the process of delineating, obtaining, and providing useful information for judging decision alternatives (p. 40)."

The central concept in evaluation, as presented by the Committee, is decision. The decision process is said to consist of the phases of awareness, design, choice, and action. Decisions are said to be made in a setting that is either metamorphic, homeostatic, incremental, or neomobilistic. Decision models that are applicable for the decision settings are the synoptic, disjointed incremental, and planned change models. The types of decisions called for may be either planning, structuring, implementing, or recycling decisions.

To mesh the concept of decision with educational evaluation, four basic kinds of evaluation are identified as context, input, process, and product. A flow chart, depicting the basic elements of decision settings, models, and types, are believed by the committee to present a total evaluation model for use by those who would approach evaluation systematically. The extent to which they actually synthesize a new definition and methodology of evaluation is not immediately obvious. Yet, given the criteria set by the Committee, the problems involved in developing an adequate theory of evaluation, and the unresolved issues that remain, the PDK Committee has written a book that anyone taking evaluation seriously should not ignore. They have definitely designed wheels that need not be reinvented. Yet, the complexity of the evaluation model and

the ambitiousness of their efforts to treat all forms of evaluation may have resulted in a more detailed model than most persons concerned with evaluation will desire. There is a criterion of fruitfulness that remains to be fully tested.

Evaluation Research

The emergence of program evaluation as a research specialty is depicted more fully by the work of Edward Suchman (1967), Rossi and Williams (1972), and Carol Weiss (1972). Others could be added to the list, but the three will suffice.

Weiss' test is based on the theme that evaluation uses the tools and methods of social research in a context of social action where traditional research methods often get bogged down. As social research, evaluation demands an imposing array of talent. Not only are research skills required but also political, social, and relational skills that enable the evaluation researcher to utilize his skills for the purpose of improving the rationality of social policy. The purpose of evaluation research, as stated by Weiss, is to "measure the effects of a program against the goals it sets out to accomplish as a means of contributing to subsequent decision making about the program and improving future programming (p. 4)."

Rossi and Williams believe evaluation research is an input to policy analysis. Its purpose is to provide evidence of the effectiveness of existing program and proposed alternatives as a basic guide to decision making. As such, it involves both the evluation of program outcomes and field experiments that would test the merit of new ideas with programmatic implications. Both forms of research should be distinguished from onsite monitoring and should help improve the social policy process. Rossi and Williams leave no doubts that policy-oriented research is indeed political. Not only are the problems methodological but they are organizational and bureaucratic. They state explicity that the role of the policy analyst and the evaluation researcher is basically forensic. It is their task to gather evidence that will persuade and influence those who must make decisions concerning the program under study. The continuance, modification, or cancellation of the program may depend directly on their skill in doing so.

As Harold Orlans (1973) has pointed out, the term program evaluation occurred only rearely in research literature until the domestic programs of the federal government proliferated in the sixties. Now there seems to be a concensus among social scientists familiar with governmental affairs that a much needed form of research is one that would evaluate the effectiveness of governmental programs.

Yet, Orlans is dubious that social scientists are either willing or able to provide the kind of evaluations that are so obviously needed. There are basic incompatibilities between research as it has been taught in most graduate schools and evaluation research as it is needed in the arena of public policy. Orlans writes that, "evaluation also faces a set of inter-linked moral and practical problems that impair its objectivity, insight, and candor (p. 123)." The successful evaluation researcher will be hard put to supply the adaptability, ingenuity, and resourcefulness that can produce an informed, careful, and relatively impartial research report. The motives to criticize whatever findings or conclusions he reaches will be numerous and uninhibited.

A Conceptual Framework for Program Evaluation

An emerging research specialty may or may not be reflected in the conceptual shifts seen in educational evaluation by the various committees of NSSE, AERA, and PDK. The evidence does suggest, however, that a more sophisticated form of program evaluation is necessary and that it may not be readily provided by persons trained in conventional research methodology. The difficulties stem from differences in approach, procedure, and expectations; they are both conceptual and methodological in nature.

The conceptual shifts that are involved in the changing demands placed upon educational evaluation may be summarized as: (1) an increasing emphasis on the use of tests and measurements for feedback and direct improvement as opposed to selection and placement of students, (2) an increasing advocacy of developmental, applied, practical, problem-solving research as opposed to basic, long-term, theory-based research, (3) a lessening of interest in conventional experimental research as opposed to research that is administratively or action oriented, and (4) a growing interest in decision-oriented research as opposed to conclusion-oriented research. For the evaluation of academic programs, these shifts would suggest that a heavier emphasis should be placed on formative, as opposed to summative, evaluation and that the results of evaluation studies will be used increasingly for policy decisions that will shape or determine program substance, form, and content. The extent to which evaluation research will be cast in the mold of operations research or institutional research remains to be seen. Also in question is the extent to which evaluation researchers can maintain scientific objectivity and detachment as these values are traditionally conceived. The degree of active involvement that is implied in some evaluation efforts requires a significant alteration of the researcher's professional role as it has previously been viewed.

An adequate conceptual framework in which to view program evaluation would seem most desirable. The model developed by the PDK Committee is highly suggestive and should help conceptualize the problems and issues of evaluation in a more meaningful fashion. There is a liability of intricacy, however, that may prevent the model

from having the influence it deserves. Persons asked to conduct evaluation studies will continue to be drawn from traditional fields and may find the model to be needlessly complex for their immediate purposes. As a result, many beneficial effects will not be gained.

To provide something of a conceptual framework for program evaluation in higher education, a provisional effort has been made in Figure 1. No effort is made to treat the framework as an operational model or to imply that it has elaborate structural features. It is strictly a functional representation of the classes of variables that are involved to varying degrees in evaluation efforts. The intent is to provide a perspective from which to view the difficulties, problems, and issues of evaluation. Many efforts at evaluation research would seem to suffer from too narrow a focus on either the process being investigated or on the tangible products or outcomes of that process. The conceptual framework should help demonstrate that there is an optimal distance from which to view most educational programs and projects; there is risk involved in standing either too close or too far back. It is possible both to magnify process variables out of proportion to their importance and to blur their features to such an extent that the process acquires blackbox status.

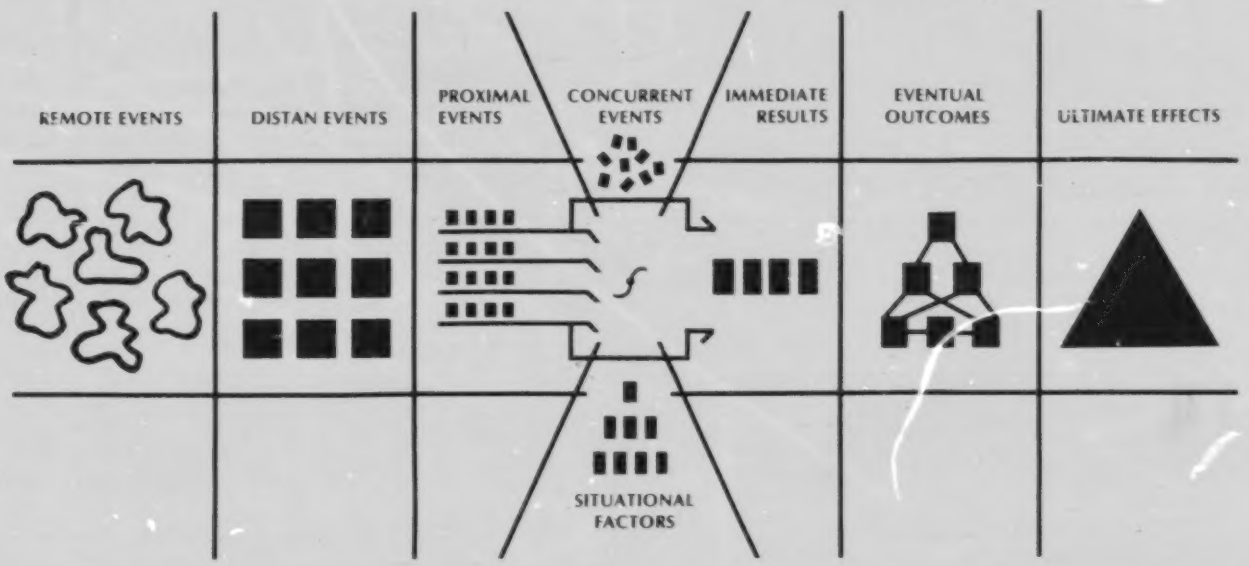
The conceptual framework or design has been borrowed from Brunswik's writings on probabilistic functionalism and should suggest the advantages of both probabilism and functional analysis. A probabilistic approach should help avoid a narrowly construed determinism that sets the researcher in search of one-to-one relationships between the several classes of variables. The time perspective should help disabuse any researcher of the notion that his efforts should serve to link remote events to ultimate effects. These two classes of variables are provided primarily for boundary purposes and should help discourage the excessive ambitiousness that some evaluation studies have been susceptible to in the past. The functional analysis of distal events and eventual outcomes should give any researcher as much as he could hope to handle.

It should be obvious from the conceptual design that a choice of variables is crucial to the process of evaluation. Proximal events will be identified as those variables that have been traditionally classified as independent or experimental variables while concurrent events will be quickly recognized as extraneous variables that must be controlled

Figure 1.

A CONCEPTUAL FRAMEWORK FOR PROGRAM EVALUATION

(adapted from E. Brunswik, "The conceptual focus of some psychological systems," Journal of Unified Science, 1939, 8, 36-49)



if functional relationships are to be clearly established. Situational factors may be seen as a special class of variables in that they have an anchoring effect on the decisions or conclusions that may be derived from the evaluation. This is to say that virtually all evaluation results will have some degree of specificity that cannot be generalized to other situations and circumstances.

Immediate results will be seen as comparable to the dependent or behavioral variables that are identified in conventional experimental designs. These will be the variables in which the researcher will be most often interested because they are more accessible, more tangible, and more easily communicated to others in decision making positions. If, however, there is a serious concern with eventual outcomes, the evaluation study must be properly executed to that end. The distinction between immediate results and eventual outcomes will depend, of course, on the researcher's own time perspective. The distinctions are broadly implied, however, and if eventual outcomes are to be treated as dependent variables, the rationale and procedures for doing so should be specified. On the other hand, if immediate results are to be treated as proxies for eventual outcomes, the reasons for doing so should be explicit.

Distinctions between types, levels, and forms of evaluation are not inherent in the conceptual design but should be facilitated to some extent by its consideration. An obvious inference is that all classes of variables need not be included in a particular evaluation study. If the conceptual framework provides any help at all, it should convey the foolishness of efforts or notions that we can evaluate academic programs in a total or comprehensive manner. The effectiveness of any evaluation effort will always depend on the researcher's ability to identify, analyze, and interpret those variables that bear most directly on the process, outcomes, or events he has chosen to study. The choice of variables, therefore, should always be explicit and as consistent as possible with the overall objectives of the evaluation study. For example, the choice of variables in organizing and implementing a system of program evaluation should reflect the difference between a monitoring system and a means for individual certification. Just as testing practices have been dominated by reliability theory as a means of providing highly stable measures of individual performance, so can evaluation efforts be derailed by the mistaken notion that the purpose is to certify individual competence. The two approaches are different and require different techniques and procedures.

In closing, it is well to mention that the conceptual framework should incorporate without undue difficulty the major advantages and implications of the schema, models, and approaches discussed previously. The primary insistence of the conceptual design is that systematic efforts at program evaluation should constitute a functional analysis of the variables that are involved and that the nature of the relationships derived or established will be probabilistic rather than deterministic. It is believed that such a conceptual approach can help avoid many of the difficulties that have been previously involved in our efforts to evaluate academic programs. The complexities of most programs in higher education and the subtlety of influential variables would strongly suggest that as urgent as evaluation is, it will not be easy to conduct the kind of evaluation studies that are needed. The methodological difficulties are staggering but they are not insurmountable. There is every reason to believe that our success or failure in program evaluation will depend primarily on our solution of the conceptual problems that are involved.

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BETTER PROGRAM EVALUATION: HOW CAN WE MEET THE CONCERNS OF TODAY WHICH WILL BECOME THE IMPERATIVES OF TOMORROW?

Oscar T. Lenning, American College Testing Program

For the past five years I have been coordinating an exhaustive literature review on the nonintellective correlates of different kinds of college program outputs which will hereinafter be referred to as "college success." This study was inaugurated in the summer of 1967 by Commission IX (Assessment for Student Development) of the American College Personnel Association, and has been continued under the sponsorship and funding of The American College Testing Program (ACT).

What one person considers success may not be success for another, and this is definitely true on the college campus. For example, some students merely want to persist while others would consider it a failure if they did not graduate with honors. Some consider their primary purpose to be preparing for a job while others are concerned about developing their social skills, developing a philosophy of life, finding a suitable marriage partner, etc. In addition to college success as seen through the eyes of the student, college success can be defined from the perspective of the colleges and their officials, the governmental agencies, society in general, and interested persons such as parents or relatives, etc.

The initial phase of the project involved searching the *Psychological Abstracts* back through 1957 for research articles dealing with anything that might be considered college success. These references and pertinent information were recorded on specially prepared evaluation sheets. Over 2,000 references were thus identified, after which the sheets were sorted into criterion categories and then into subcategories.

Once some college success categories and the foci of the study had been ascertained, a thorough search of the literature was initiated. Between 5 and 6 thousand different pertinent references of published literature were found, and this does not include unpublished reports or dissertations. Furthermore, this figure does not include published references prior to 1963 in the grades, persistence, and academic learning areas because a large number of published reviews of literature were found which seemed to adequately summarize the literature for those areas to 1963.

One of the noteworthy results of the project on college success was the development of a criterion classification system with broad categories and subcategories of success as defined by various publics. As mentioned previously, the categories of college success were, in a manner of speaking, empirically derived. For each criterion area specified, a number of research studies relating the criteria to other variables were found. Some of these studies actually attempted to predict the criterion while others were concerned only with trying to provide insights and to broaden the level of understanding of the criterion.

About 400 of the research studies were selected for annotation. The annotations and references (grouped according to criterion and predictor categories) have been organized into two monographs, which are expected to be published by the end of 1973.

As the many studies were critically reviewed to see which should be annotated, a number of observations about research methodologies and pitfalls were observed which should be of interest to institutional researchers. These observations and concerns seemed to be of problems that also presently hinder effective college program evaluation, and they are the topic of this paper.

I am not trying to equate "educational research" with "program evaluation" in this paper. For example, evaluation must often utilize rough indicators which would not qualify for designation as formal research measures, and much of program evaluation does not involve use of statistical tests. Evaluation should be a continuous process that starts with the beginning development of a program and continues throughout the life of the program. It is an ongoing process that is continually feeding back information to the program coordinators and others. Furthermore, it changes and refocuses as the program is modified in response to such feedback. An educational research project on the other hand tends to be strictly summative in nature with pre-established research hypotheses as guidelines for the research study.

What I have been talking about is "formative evaluation." After the program is operational, much of the formative evaluation data is pulled together into "summative evaluation" form, and usually some additional overall evaluations of the program outputs are conducted. This summative evaluation is in effect local educational research or institutional research, and many of the published studies of college outputs were of this type.

When program evaluation reaches the summative stage, it is helpful to be able to compare your evaluation experiences and results with those obtained for similar program at other colleges. The discussion throughout the remainder of the paper focuses on this aspect of program evaluation.

The Research Pitfalls Noted

In a delightful address in 1965 to Division 14 of the American Psychological Association, Marvin D. Dunnette (1966) outlined six "fads, fashions, and foibles in psychology" which he felt summarized what was wrong with the profession. Several of his points are very much applicable to the research on college success which was reviewed. His first heading was titled "The Pets We Keep" or alternately "What Was Good Enough for Daddy Is Good Enough for Me." He was talking about a premature commitment to a particular theory or research method. The analytic methods used in a number of the studies raised questions of appropriateness. Perhaps the reason some of these studies used inappropriate methods was that the researchers had a "pet" method they tended to always use or perhaps many of them were unfamiliar with other more appropriate methods and did not have access to a statistician.

Something that may be contributing much to the problem of using inappropriate methods is our system of graduate education. It is questionable whether the majority of graduate schools in this country are providing an adequate background in research design and methodology. Secondly, there is a tendency for particular "schools" of thought and methodology to predominate in a university. Futhermore, it is probable that some graduate students are overly influenced by the preferences and biases of their major professor.

Dunnette's second heading was entitled "The Names We Love" or "What's New Under the Sun." What he was talking about here are the imprecise definitions and the vague constructs prevalent in various areas of education and psychology. He says:

> Perhaps the most serious effect of the game is the tendency to apply new names in psychological research widely and uncritically before sufficient work has been done to specify the degree of generality or specificity of the "trait" being dealt with. Examples of this are numerous — anxiety, test-taking anxiety, rigidity, social desirability, creativity, acquiscence, social intelligence, and so on — *ad infinitum*. (p. 345)

Dunnette's next title was "The Fun We Have" or "Tennis Anyone?" In this fad, the researcher gets so caught up with computer capabilities or testing null hypotheses that he forgets the real problem and also perhaps forgets to personally look at the data itself. Dunnette believes this is primarily responsible for what he calls the "little studies" or the "little papers" of psychology, which were found to be so prevalent in the research on college success. Actually, small studies at single institutions can make important contributions to the institution, as most directors of institutional research can attest. In addition, such studies can make real contributions to the field if they deal with parts of important problems and if they can be synthesized and integrated. The negative reaction of Dunnette is not against such "little studies," but rather against those little studies where the research is poorly designed, poorly documented and exploring something of little worth. Furthermore, the emphasis throughout the sixties on "*number* of research publications" as an important variable for faculty evaluation has been a central part of the problem for educational researchers outside of the Institutional Research Office. Because of this emphasis, some researchers have been more concerned with adding to their publication list and with merely going through the motions of research than with making contributions for the good of their institutions and for the good of our young people and of our society.

A final heading of Dunnette's that should be mentioned is "The Secrets We Keep" or "Dear God, Please Don't Tell Anyone." He reported a paper by Wolins (1964), who wrote to 37 authors asking them for the raw data on which journal articles were based. Of the 32 authors replying, 21 no longer had their raw data. Wolins did reanalyses on the seven sets of data he was able to obtain and found that three of the studies had gross errors which changed the outcome of the study. Dunnette includes in this category the following types of problems, all of which abounded in the reports on studies of college success: statistical difference tests reported without their corresponding means, SDs, and the correlations between the two variables; experimenter biasing factors; incomplete descriptions of methodology; failure to carry out or report cross-validation studies; and failure to carry out or report replication studies. Dunnette also reported, and this may or may *not* be extensive, that some researchers have the improper practice of routinely dropping subjects from their analyses.

It was mentioned that summative program evaluation did not always need to involve statistical tests. However, when such tests are conducted all necessary data for replication and comparison by others should be included in the study report. Similarly, the description of the total project should be comprehensive enough that others reading it have the complete picture and can easily evaluate the adequacy of the evaluation study.

After reading Dunnette's fascinating account, is it any wonder that syntheses of a large number of studies in the literature are difficult to accomplish? It seemed almost impossible to really synthesize the findings from all the little studies reported in the literature because of such factors as differences in sampling procedures, differences in criterion definition, and lack of documentation con-

cerning the design and the results. Through use of a set evaluation form, we have been able to gather as much comparable data as possible from each study. However, many studies did not report all essential data. In addition, there were also a number of other serious research pitfalls noted in many of the studies reviewed during the project.

Many of the studies used improper control groups or did not use any control group when one was clearly called for. For example, no attempt was made in almost all of the studies of the institution's overall impact on student change to examine change in comparable nonstudents during the same interval of time for which change was being examined for college students. Most studies that found personality change and other change in college students have merely assumed that the college experience was a factor in bringing about the changes, e.g., the observed changes in autonomy, authoritarianism, dogmatism, and independence. Similarly man's studies of the impact of particular programs only looked at the change itself, and did not compare it to the change taking place in students at this college who were outside of the program. They just assumed that the program was involved in the change.

Concerning studies of change, many of the researchers made no attempt to control for student input characteristics. For example, it is common for change to be related to aptitude, and so aptitude is one variable that should often be controlled.

There are a number of ways to control for inputs. Examples of simple experimental methods are matching or stratification. However, sophisticated statistical methods of control such as analysis of covariance may be called for in some cases. Because of a large sample size matching procedures may be impractical, and sometimes matching or stratification do not give the degree of control desired. Stratification gives only gross control on the variables of concern. Secondly, the desire may be to use the intact groups for which differences are to be examined. Futhermore, analysis of variance requirements of proportionality of cell frequencies may prohibit the use of stratifying, and matching may distort the distribution of one or more of the groups being compared. In addition, it may be desired to control on a number of groups and in some cases it becomes desirable to later control on unanticipated variables. For research strategies in studying change or college impact, see Harris (1963) and Feldman (1970).

Many of the student samples in single-campus studies were quite small and they often appeared to be just "grab" samples with no real attempt to have representativeness. Furthermore, many of the small samples on which one-tailed *t* tests were used probably did not meet the "normal distribution" requirements for such a test, and a two-tailed *t* test or nonparametric tests should have been used instead. Different statistical procedures have different distribution requirements. For example, when group comparisons are to be made, the relative homogeneity of the groups becomes important. Researchers all too often completely ignore such considerations.

Many studies did not explore the two sexes separately. From other studies, it was apparent that there were important sex differences on many of the variables being explored. To demonstrate the seriousness of this, suppose you are studying change and it happens that both sexes change a large amount, but in opposite directions. If you look only at change for the total group, you will erroneously conclude from your results that no change has taken place.

It would also be desirable in program evaluation to examine special subgroups of students within the program to see if the program has differential effects on students with different characteristics. For example, in the literature on teacher evaluation, Domino (1970) found that conforming students tend to do well in a class taught in a structured manner and poorly in a class taught in an unstructured manner, with the converse being true for students with an independent orientation. Most of the published studies only examined diverse groups of students such as freshman or a psychology class, and did not explore subgroups.

Another methodological problem was the use of invalidated instruments. Some studies used locally constructed instruments that were poorly designed and appeared to never have been field tested in any way. No matter what your location or clientele, it should be possible to try out an evaluation questionnaire ahead of time on a few people rather than relying entirely on "arm chair" evaluation of the questionnaires. However, even some of the widely used and accepted personality tests or inventories as well as other published instruments have questionable validity because of the nature of the constructs being studied. Care should be taken in choosing such standardized instruments to make sure that they are appropriate measures of what you wish to examine for the particular program you wish to evaluate. The specific goals of the program are crucial in making such decisions.

A final problem noted was the "helter skelter" way the social science professions have of disseminating research results and of applying them to practical situations so that they will eventually have a genuine impact on the student and his college and on society. Not only is there a lack of coordination in communicating research results, but much of the research is quite old by the time it is published. A number of institutional researchers have made good progress in overcoming some of the communication problems within the institution. One reason for this is that institutional research people tend to be much more oriented to research application than are academic researchers. Futhermore, most of their research is designed to provide direct decision-making assistance. Because of

this research emphasis, many institutional researchers make conscientious attempts to summarize their data into charts and other forms that are easily understood by non-statistical people; to write up separate, short, and eye-catching reports directly aimed at specific college officials on their campus; to emphasize those results which have the most practical significance; to make use of media such as the faculty newsletter and the campus newspaper for communication when appropriate, etc. Even so, such people are continually trying to improve their intra-institutional communication methods.

Institutional researchers have in the past been at a disadvantage when it came to communication among institutions. Research journals were generally not interested in decision-making studies limited to one campus, and institutional research conferences were few and far between until the decade of the sixties was well underway. One problem, of course, was that until the 1960's institutional research was universally carried on by many departments and people throughout each campus, and there were no central institutional research offices to coordinate and assist in such research efforts, and to focus on campus-wide research concerns. Hopefully, the ERIC system will continue to make progress in reforming our research inter-institutional communication system, but something more is needed as suggested in the following section.

Conclusions and Recommendations

The theme for the 1973 AIR Forum is "tomorrow's imperatives today." One of the subthemes concerns "educational program imperatives," which includes program evaluation and research on student and college outputs (college success). An imperative for tomorrow in this area, that has been of more and more concern the last several years, is the need to provide clear-cut evidence to governing boards, legislatures, and other concerned publics about whether an institution is accomplishing all of its objectives. Another imperative is that local research not be done in isolation but that it contribute to overall knowledge about students, educational programs and methods, and institutions. The previous section outlines some important reasons why we have not been able to meet such needs at the present time.

As the decade progresses, and inflation and taxes continue to rise, the pressures on institutional researchers to do a better job of program evaluation will probably reach unprecedented levels. They will be forced to use more appropriate evaluation methods and to cooperate more, and they in turn will put pressure on those in measurement and basic research to develop more concrete and useful measures of program outputs for institutional use.

What are some possible solutions to the methodological problems outlined? Three possible solutions, which are not mutually exclusive but which are all probably quite controversial, are proposed in this section.

One possibility concerning the methodological problem mentioned in the preceding section is for graduate schools to provide a better background in research and evaluation design and methodology. Such a long-term development should conceivably help the situation. However, a report by Novick (1972), although it would appear to encourage better training in statistical methods and research design, questions whether adequate training in statistical methods will solve the problems outlined unless the skills are used often enough for the researcher to maintain them at a high level of efficiency. Novick's report further suggests that computer systems may be developed which can supplement and possibly even supplant some of this desired training, as indicated in the following quote about a prototype computer-assisted data analysis system:

> (Even those with) substantial training in, understanding of, and competence in statistical methods . . . are unlikely to exercise those skills often enough to maintain them at a high level of proficiency. These investigators can use and are typically receptive to guidance in their statistical work provided they remain in control of their own analyses. Investigators with less statistical skills will benefit from even more directive guidance through the maze of detail required of good statistical practice. For all investigators, the tedium of computation or alternatively, the maintenance of esoteric computer expertise, is a regrettable hindrance to their function of extracting meaning from data.
>
> The system described here is an interactive computer-based system for assisting investigators on a step-by-step basis in the use of a particular analystic tool — Bayesian analysis using the two parameter normal model. The example is meant to be suggestive of the kinds of computer-assisted data analysis programs that can be developed for use by scientific investigators. Programs such as these can also be used in the classroom and laboratory for teaching purposes, but beyond this they can be used by the practicing scientist in his day-to-day work . . . An important feature of this program is that it interacts with the investigator in the English language. The investigator *need* not be familiar with computer languages or with the internal workings of the computer. He need only learn how to sign-in and sign-off the terminal and to make simple alphabetic and numeric responses. (pp. 1-2)

It would seem probable that such "computer assisted data analysis system" capabilities could be inexpensively

distributed to the various campuses through the use of terminals from a central computing facility. In addition to guiding the selection of samples, the selection of proper statistical analyses, and the actual computational procedures, the system could conceivably be programmed to assist the researcher to avoid pitfalls in the interpretation of his study results. Also, as new and improved statistical techniques (e.g., better ways to control for complex inputs) are developed, these could be incorporated into the system without having to worry about their misuse. New technical developments like this, and computer systems being developed by agencies such as the Western Interstate Commission for Higher Education (WICHE), could be invaluable aids in meeting the methodological imperatives for research in the future.

Another possible part of the solution may be for consortia among researchers and among colleges to become commonplace, and in each case it would be essential that there be good coordination so that the small parts of any study would facilitate one another in a planned way. Many consortia in the past have failed or been largely ineffective because of poor leadership and coordination, a lack of real commitment on the part of participants, or related problems such as a lack of follow-through and cooperation by participants. Yet there have been some consortia that have been quite effective and successful, e.g., the Central States Colleges and Universities (CSCU) Consortium which has been active since 1957. Hopefully, through careful planning (including pilot projects to try out the concept), proper leadership, and emulation of procedures used in previously successful consortia, the pitfalls of many people working closely together from widespread localities could be surmounted.

Effective consortia could allow expert design consultation to take place as a routine matter. Coordination on predictors, methods, and criteria could allow all of the little studies that make up a consortium to add up to a significant whole that could indicate how colleges of different types and in different regions of the country differ. They would also allow many of those small institutional research studies that are now considered too insignificant to be published by a research journal to add to the basic published educational research literature after meeting local institutional research needs. In addition, they could give people who are outside of a central I.R. office, who have access to data but who do not have enough confidence in their research abilities to do research on their own, the opportunity to take part in significant research endeavors. Futhermore, the widespread development of such consortia, each consorium study attacking a specific priority problem that has been agreed on by the coordinating agency or person and the participants, might do away with much of the emphasis on "faculty research quantity rather than quality." Quality would be built into the system.

Individual initiative within the project and individual supplemental evaluation outside the project would be encouraged. Certainly you would not want to interfere with the initiative and creativity of the individual researcher or evaluator. Participation in such a cooperative research and evaluation effort could also provide excellent learning experiences for graduate students.

Who would initiate the idea for a particular consortium study? Presumably people with particular program needs who would like to cooperate with others. Professional associations, such as AIR, or other agencies could act as clearinghouses and publicize throughout the country the fact that particular projects had been proposed to study particular problem on college campuses. A regional set-up might be even more desirable.

Whether widespread applications of the possible partial solutions proposed here are realistic or not, only time will tell. They are presented here primarily to stimulate discussion and thought. There may be other possible solutions that hold more promise.

Whatever direction we go remains to be determined, but it seems safe to say that the educational-program research imperatives of tomorrow call for new research priorities and a new research outlook. Reappraisal and redefinition must take place; new and specific criteria and predictors must be explored; methodological and philosophical pitfalls of the past must be avoided; and steps must be taken to maximize the practical impact (on the college, on students, on college faculty and staff, on society, etc.) of such research.

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Feldman, K.A. *Research strategies in studying college impact.* ACT Research Report No. 34. Iowa City, Iowa: The American College Testing Program, 1970.

Harris, C.W. (Ed.) *Problems in measuring change.* Madison, Wisc.: University of Wisconsin Press, 1963.

Novick, M.R. *Bayesian considerations in education information systems.* ACT Research Report No. 38. Iowa City, Iowa: The American College Testing Program, 1970.

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A DETERMINISTIC MODEL FOR INVESTIGATING THE FEASIBILITY OF YEAR ROUND OPERATION

C.J. Christie and D.J. Hipgrave, Woods, Gordon & Co.

There have been numerous public statements in the past several years by business, academic, and political leaders favouring the all-year operation of universities and colleges. In most cases, the suggestion to switch to year round operation is based on the argument that there is a need for a more complete and efficient utilization of educational facilities and that the biggest single factor contributing to the low overall university utilization is the summer shut-down of undergraduate instruction. Other arguments suggest that an all-year university operation would help students complete their education and become financially self-sufficent at an earlier age, while at the same time removing from the economy the need to provide a large number of jobs to students during the summer months.

Mr. A.C. Scrivener, President of Bell Telephone Company of Canada, recommended in June 1970 to the Canadian Chamber of Commerce that they give leadership to a review of university operations. In particular Mr. Scrivener proposed that universities operate two six-month terms each year and that work-study programs be expanded. In this way, he felt that better utilization of the university facilities would be achieved and that students could more easily earn their way through university by alternately working and studying in these six-month terms.

The Honourable William Davis, then Minister of Education for Ontario, spoke in Thunder Bay in February 1971 indicating that he looked favourably on proposals for lengthening the university year to permit honours students to get their degrees in three instead of four years. The Globe and Mail, in their editorial of February 3, 1971, commented favourably on Mr. Davis's remarks. They continued by saying that Ontario's grants to universities for both operating and construction had increased to $495 million that year from $155 million in 1965-66 and that "we can't stand another five years of high budget increases."

The Globe and Mail continued their support for the "12-month university year" in a later editorial (written after Mr. Davis became Premier) pointing out that Prime Minister Trudeau and the Secretary of State, Gerard Pelletier, appeared to favour extension of the university year. Mr. Trudeau said: "If we didn't have this type of school year we have now which is based on an agricultural society where people attended universities and schools during the winter months and in the summer they worked on the farm in order to pay for their winter it is certain we wouldn't have this bulge of young people looking for work in the summer, and to try to meet that we are trying to convince the provinces, they they should be more and more considering the full academic year, without this summer break."

Mr. F. Lazar, a doctoral candidate in economics at Harvard and regular commentator in the Globe and Mail on trends in the Canadian economy, wrote in the April 13, 1972 issue: "It is generally accepted that the current structure of the post-secondary academic year does not fully utilize the existing facilities. Thus the average taxpayer may rightfully inquire whether a plan for a fundamental restructuring of the school year cannot be developed so that it not only will provide for a more efficient use of educational facilities (and perhaps moderate the costs) but also will improve employment prospects for students."

These quotations reflect the views, we believe, of a large number of Canadians who feel that year round operation of universities is desirable and that one of the major benefits of such action is an improvement in efficiency and a corresponding reduction in total costs to society. Is this assumption of increased efficiency and reduced total costs in fact correct? Most of the people who make such statements assume it to be obviously so but seldom have done an in depth analysis of the economic consequences of year round operation.

In August 1971 the Commission on Post-Secondary Education in Ontario awarded a contract to Woods, Gordon & Co. to undertake a study on the "Organization of the Academic Year." The main objectives of that study were:

1. To describe the options in the organization of the academic year.
2. To examine the merit of these choices.
3. To estimate the effects of the various choices on operating and capital costs of post-secondary institutions.

An important feature of this study was to be the use of quantitative modelling to estimate those operating and capital cost effects.

Our presentation today will ignore all of the many other advantages and disadvantages of year round operation and will deal with the one issue which is generally taken for granted — "Is year round operation more efficient and less costly to society?"

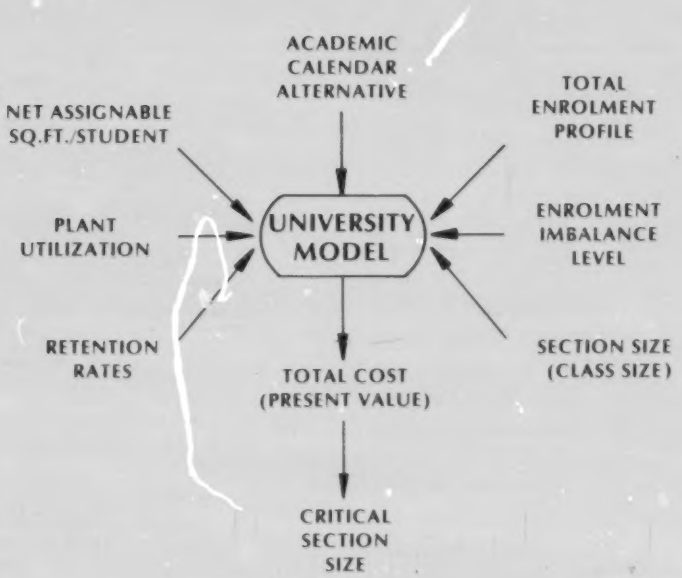
Model Formulation

It became quite clear at the outset of this project that detailed costs for a university, and in particular costs in a form which could be related to year round operation, were not readily available. This ruled out the approach of attempting to correlate costs with some key variables and selecting the best fits as a basis for the model. The decision was made at this stage to base formulation of the model on aggregate cost figures (Statistics Canada, Department of Colleges and Universities of Ontario) and from data obtained at a Canadian university. The latter was chosen because of its experience with the trimester program and because detailed cost figures were readily available. Having formulated this model of a "typical" Ontario university a parametric analysis was undertaken whereby the important variables were independently assigned different values and the effect on total systems cost could be observed. Exhibit I shows the key variables that were assigned different values or a range of values in the analysis. Other variables are important in this analysis but only those which were allowed to vary are shown. These were chosen because they were the variables considered to have economic importance in going to year round operation.

The model uses total costs over a 20 year period (1971 - 1990) in comparing academic calendar year alternatives. The method used was to select a parameter set (specific values for total enrolment profile, section sizes, retention rates, plant utilization and net assignable square feet per student) and calculate total costs for a number of year round alternatives at changing levels of term enrolment balance for each year (percent of total enrolment attending each term) of the time span considered. The present value of these costs are calculated and compared against that for the standard two-term program.

Exhibit I

YEAR ROUND OPERATION OF UNIVERSITIES — A PARAMETRIC ANALYSIS



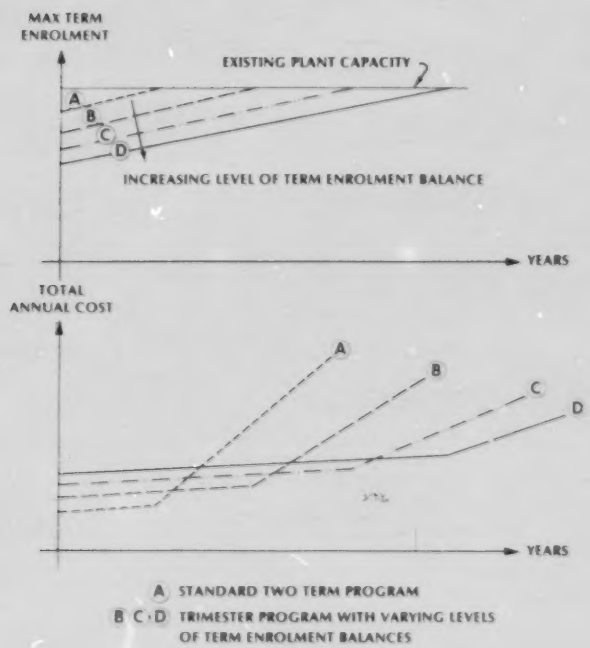
This approach is illustrated in Exhibit II by showing a comparison of the standard two-term program (curve A) against a trimester plan with three levels of term enrolment balances (curves B, C and D). The upper graph shows maximum term enrolments for each of these four conditions ranging from the standard program with no summer enrolment and a high maximum term enrolment to the trimester plan with three equal term enrolments and hence a lower value of maximum term enrolment. The lower graph in this exhibit is a plot of the total annual costs over the span considered for the four conditions. These costs include operating and amortized capital costs. The capital costs are only incurred when it is required to purchase additional plant and this occurs when the curves as shown in the upper graph reach the existing plant capacity. Hence the points on the lower graph where the cost curves increase in slope coincide with those points on the upper graph where the maximum term enrolment exceeds the existing plant capacity and additional outlay is required for plant expansion. This point would occur earlier for the standard program as shown and later for the trimester program indicating the capital outlays are delayed as the balanced term enrolment condition is approached. In addition the slopes of curves decrease as the balanced term enrolment condition is approached indicating that the capital outlays are reduced as the total enrolment is spread more equally across three terms. It must be remembered here that these are not actual results obtained but rather a basis upon which the model was formulated.

The initial slopes on the curves in the lower graph indicate a base of annual operating costs which increase in accordance with the increase in the level of total enrolment over the time span. These annual operating costs initially assume that each course is taught in at least three classes and there is therefore no increase in instruction costs in going to extended year operation with a trimester program. There is however an increase in the level of the operating costs from curve A to D and this is accounted for by the increase in operating costs other than instructional costs which are proportional to the increase in the academic year length and the extent to which the trimester program achieves a balanced term enrolment condition. Exactly how this is accounted for in the model is explained later in this paper.

The model calculates the present value of the total costs of B, C and D and relates this to the present value of the total cost of A. Assuming that the present value of either B, C or D is less than A, then the indication is that the

Exhibit II

COMPARISON OF ALTERNATIVE ACADEMIC PLANS USING THE PRESENT VALUE OF TOTAL SYSTEMS COSTS



trimester program at some level of term enrolment balance is economically attractive and should be considered as a feasible alternative. However the analysis does not stop here but must go further to convert the results into operating decision rules. Recall that the assumption was made that each course in the standard program was taught in at least three sections and also that the increase in base operating cost in the trimester plan did not include instructional cost increases. This assumption is now relaxed and the model allows the section sizes to reduce in the trimester program with a corresponding increase in instructional costs such that the present values of the two systems are made equal.

This indicates what section sizes must be achieved in the alternative program to at least make it economically equal to the standard program. The critical value in this analysis is therefore section size (class size).

Academic Policy Implications of Model Results

Experience at universities has indicated that the success of trimester or quarter operation depends on balancing off the increase in operating costs by the savings in capital costs with these plans. The high operating cost results primarily from the decision to maintain a full course offering in the face of lower term enrolments, particularly in the summer term. If a university operating a standard program has the majority of its courses offered in multiple sections, this increase in operating costs will not be great. However, if the majority of a university's course offerings are given in one section only, many new sections will have to be opened and, with the same general level of overall enrolment, the section sizes will be reduced in switching to a quarter or trimester plan. It then becomes of interest to determine what mean value of section size will make the discounted cost of the standard program and the alternative under consideration equal. These section size values at the break-even point are referred to as the critical section sizes.

The critical section size values are directly dependent on the saving in capital costs minus the increase in operating costs for the year round alternative under

Exhibit III

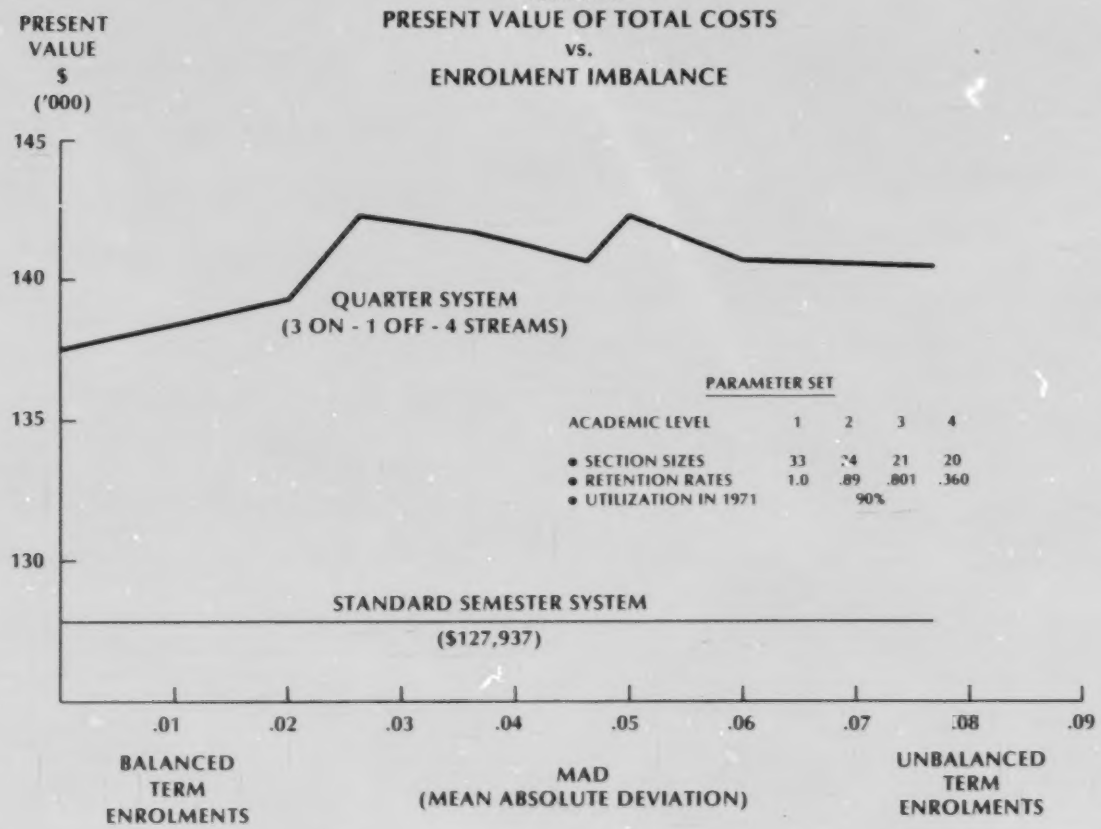
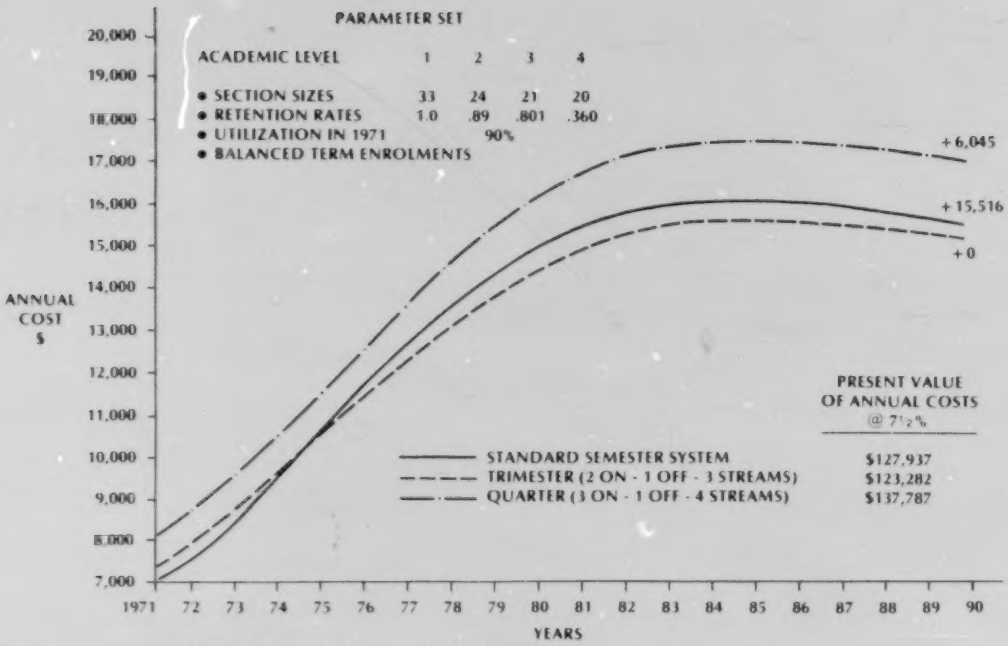


Exhibit IV

TOTAL ANNUAL COST* VS. YEARS



*NORMALIZED ANNUAL COSTS PER NUMBER OF FRESHMEN STARTING IN 1971

consideration. This is because the difference is converted into a section size reduction to the critical value if the result is positive and an increase in section size if the result is negative.

If the difference is exactly zero, then the critical section sizes are the section sizes present in the standard program and the indication is that there is a fair trade-off between the savings in capital costs and increase in operating costs. Hence, nothing is to be gained economically in switching to year around operation.

The policy implications of this analysis are that the university must regulate its course offerings for the trimester or quarter plan so that the resulting mean section sizes are equal to, or greater than, the critical values. Course offerings for the year round alternative which result in section sizes less than the critical values indicate uneconomical operation.

In predicting whether an institution could maintain mean section sizes at the critical values if it switched to a year round alternative, the academic policy-makers would have to determine the number of repeated sections for each course offering under its present system. It could then be possible to determine the extent of adjustments in course offerings necessary to maintain the critical section sizes under the new plan. For example, if an institution were operating under a standard two-term plan and each course were offered three times (in three sections) then switching to a trimester plan would not result in a decrease in section sizes and no increase in instruction costs would be incurred.

If each course in the standard program were offered in a single section and it was decided to switch to trimester operation, then instructional costs would triple with a complementary reduction in mean section sizes to one-third their original level. If these section size values were below the critical values calculated in the model, the only choice left would be to drop courses to increase section sizes to at least the critical values.

Summary of Model Results

Many computer runs of the model were made to show the effects on costs and critical section sizes of

changes in the key input variables. The approach was to change the value of one particular variable such as section sizes and compare the results of the run for the year round alternative to the results of the run used as a benchmark. (i.e. the standard semester system). As mentioned earlier changes were made in total enrolment, term enrolment balance, section sizes, retention rates, plant utilization and net assignable sq. ft. per student. These changes were made one variable at a time so that the effect on total costs and critical section sizes to a change in this variable could be isolated.

The following important conclusions are based on the model results.

a) The quarter system with the same freshman enrolment pattern as all other programs is economically unattractive under all operating conditions that were examined in the model, and should be ruled out as a feasible alternative. Exhibit III shows that the present value of total costs for the quarter system is greater than the present value of total costs for the standard semester system for all values of term enrolment imbalance levels. This was found to be true for all parameter sets examined in the model. To see how this looks on an annual cost basis Exhibit IV shows a plot of total annual cost for the years from 1971 to 1990 for the balanced term enrolment condition. The total annual cost curve for the Quarter program never crosses the cost curve for the standard semester program over the years considered.

b) The model results indicate that there may be some economic advantage to be gained in switching to a trimester program. As Exhibit V indicates the present value of the trimester program is less than that for the standard 2 term program particularly at the balanced term enrolment condition ($123.282 vs. $127.937). This allows a maximum reduction in average year round section sizes of 6.1% for the trimester program at which point the net present values of the two systems are equal. Exhibit IV shows that the total annual cost curve for the trimester program crosses over the cost curve for the standard program in 1975 and remains at a lower value for the

Exhibit V

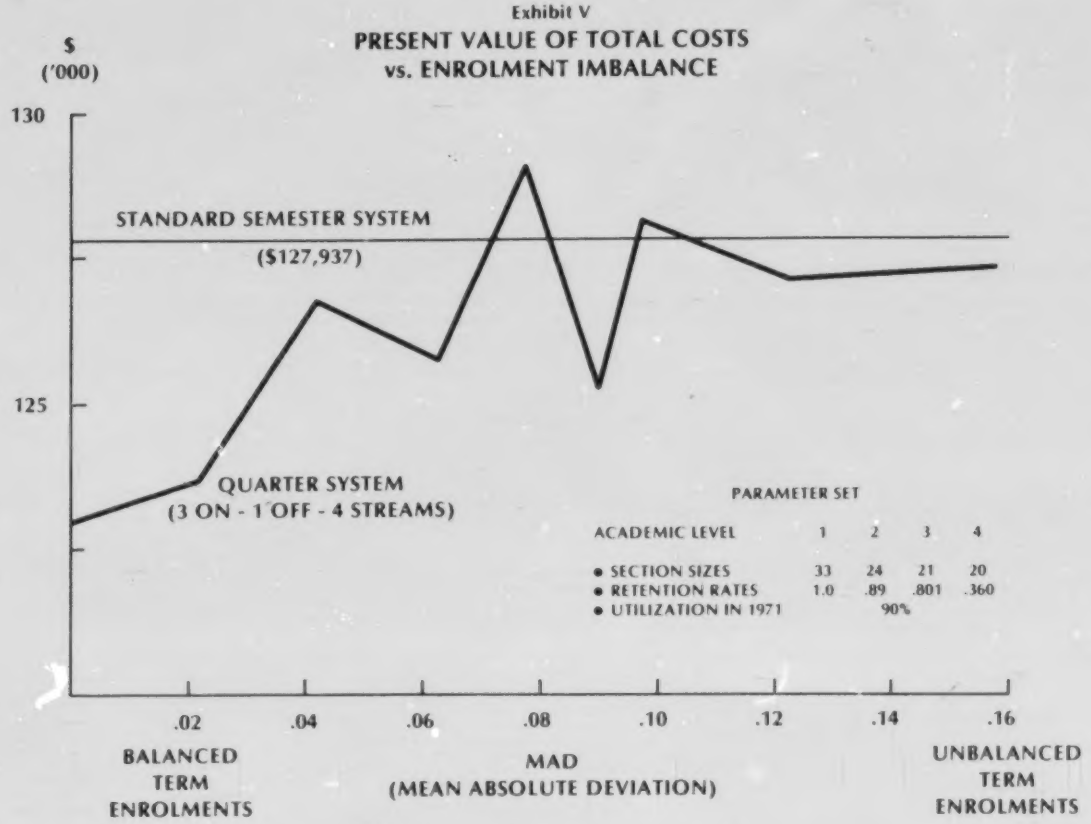
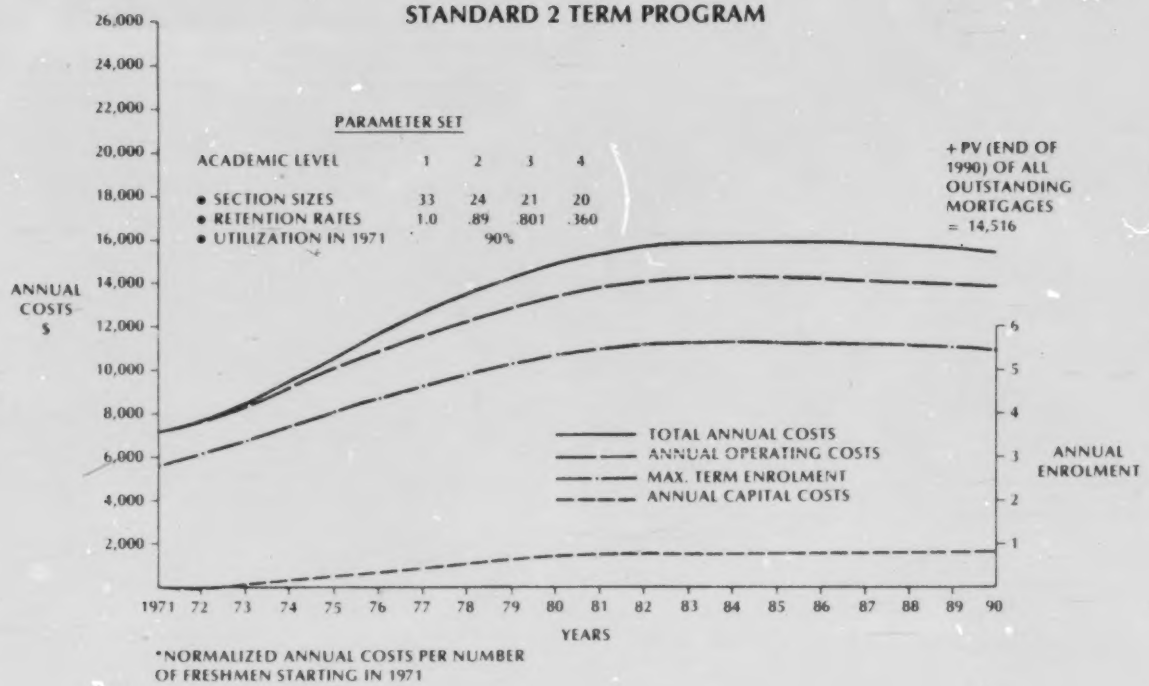


Exhibit VI
ANNUAL COSTS* VS. YEARS STANDARD 2 TERM PROGRAM


PARAMETER SET
ACADEMIC LEVEL 1 2 3 4
• SECTION SIZES 33 24 21 20
• RETENTION RATES 1.0 .89 .801 .360
• UTILIZATION IN 1971 90%
+ PV (END OF 1990) OF ALL OUTSTANDING MORTGAGES = 14,516
ANNUAL COSTS $
ANNUAL ENROLMENT
TOTAL ANNUAL COSTS
ANNUAL OPERATING COSTS
MAX. TERM ENROLMENT
ANNUAL CAPITAL COSTS
YEARS

*NORMALIZED ANNUAL COSTS PER NUMBER OF FRESHMEN STARTING IN 1971

remainer of the time span considered.

c) Amortized capital costs make up a small portion of total annual costs in the university system as determined in the model. This is caused by a levelling off of student enrolments over the twenty years simulated and this factor has an important effect on the economics of year round operation. Exhibit VI shows capital cost and total cost plotted against years for the standard two term program for 1971 utilization factor of 90%. Also plotted on this graph are annual operating costs and maximum term enrolments. As explained previously, capital costs are a function of the 1971 utilization factor and the maximum term enrolments and for this case account for approximately 12% of the total annual costs of the system at their highest level. As the 1971 utilization rate is reduced, it is reasonable to expect that capital costs are reduced and therefore 12% is the maximum percentage of total costs that is reached.

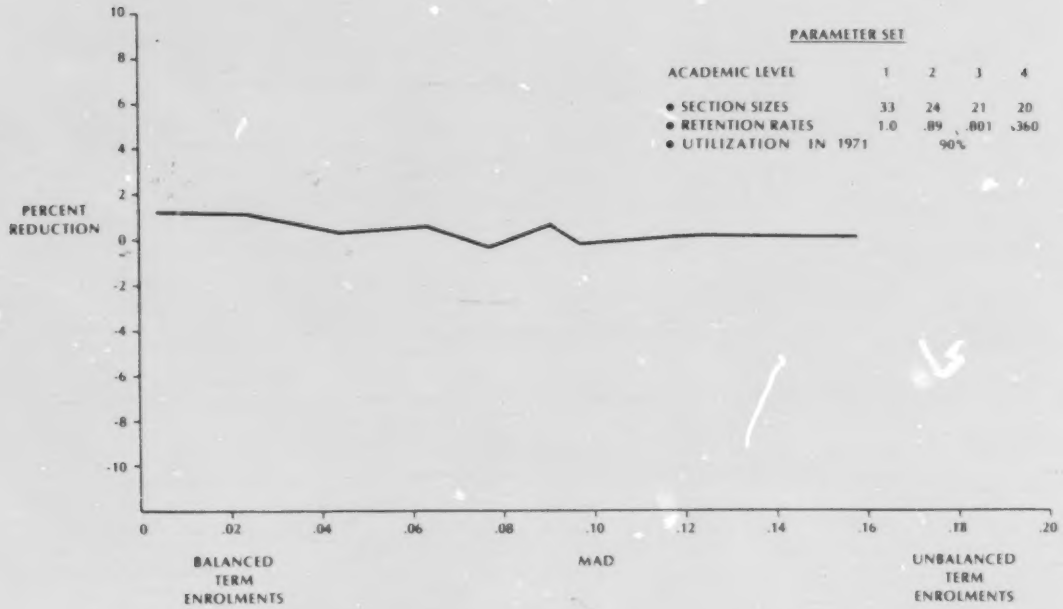
Since the economic advantage in switching to year round operation is based on some saving in capital costs over an increase in operating costs, the absolute value of capital costs is an important factor. With the projected stabilization in university enrolments, capital expansion is no longer required after a certain time (approximately 1981 in the model) and therefore the economic advantage of year round operation would be decreased.

d) There is a fair trade-off between savings in capital costs and increases in operating costs as the enrolment imbalance levels in the year round programs are varied. Consequently, the level of imbalance of term enrolments for the year round alternatives considered has little effect on the present value of total costs and critical section sizes.

Exhibit VII shows that year round critical section sizes are a flat function of MAD (mean absolute deviation) or term enrolment level of imbalance. This points to the fact that as the term enrolments approach the balanced condition, the increased saving in capital costs in changing to a year round program is offset by a corresponding increase in operating costs.

Exhibit VII

YEAR ROUND SECTION SIZE REDUCTIONS
vs.
LEVEL OF IMBALANCE (MAD)
TRIMESTER PROGRAM 2 ON - 1 OFF - 3 STREAMS



e) There appears to be less economic incentive, if any, to switch to year round operation with low values of the 1971 utilization factor.

Exhibit VII shows the effect of assuming various values of utilization rate on the present value of total costs. Total costs for the standard semester program and the trimester program were compared for the balanced term enrolment condition for three utilization rates (60%, 70%, 90%). The difference in the present value of total costs for the trimester alternative minus that for the standard program becomes smaller and in fact becomes negative as the utilization rate drops from 90% to 60%. This is caused by fewer amounts of capital outlay as the utilization rate decreases. In other words, with a 1971 utilization rate of 60%, the increases in student enrolments through 1990 are served by smaller capital expansion costs than for a starting utilization rate of 90%, which reaches its plant capacity at any earlier date. With reduced plant expansion required at the lower utilization values, the reduced savings in capital costs are offset to a larger extent by the same increase in operating costs of the year round system. Hence the allowable reductions in critical section size values are less for each imbalance level.

f) An increase in the ratio of instruction costs to amortized capital costs, with a reduction in average section sizes, indicates that there is less economic incentive to switch to year round operation. When the absolute values of the average section sizes for the programs considered were reduced, the present value of total costs rose, as did the average value of the critical section sizes.

Exhibit VIII

PRESENT VALUE OF TOTAL COSTS vs. UTILIZATION RATE

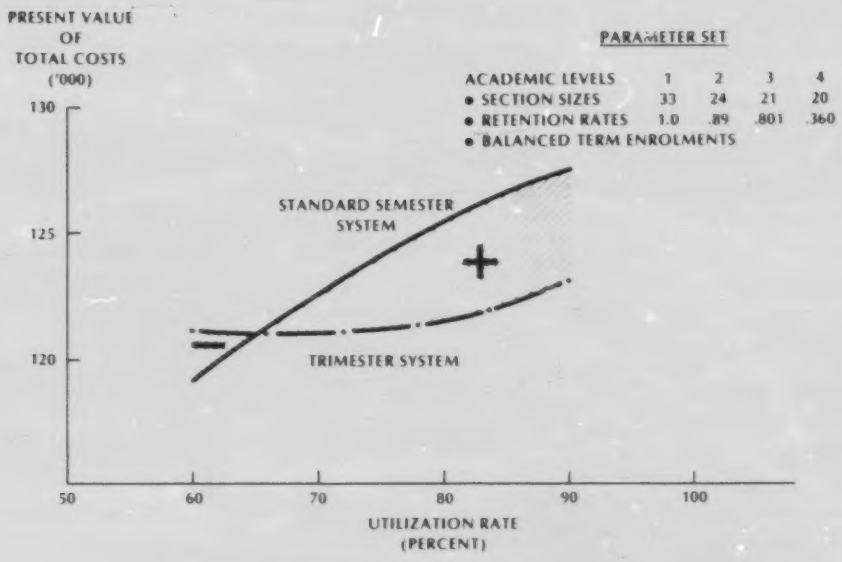
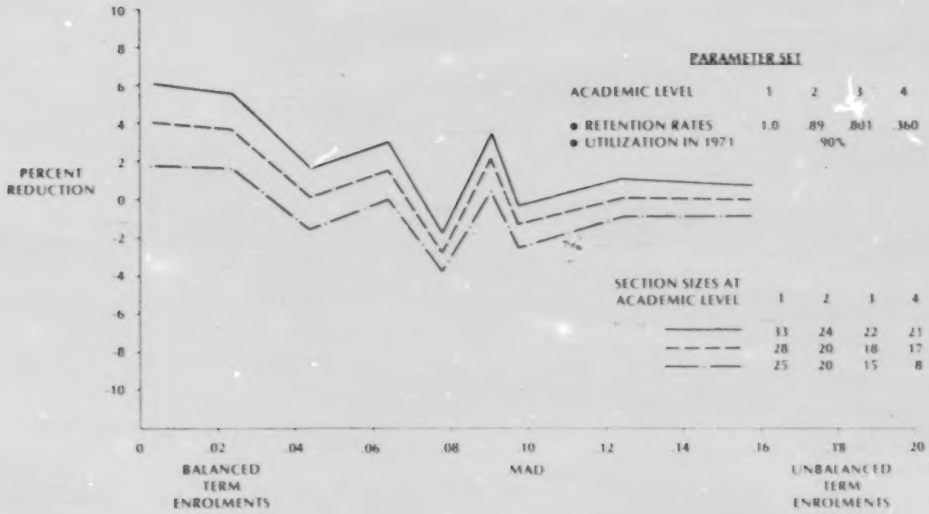


Exhibit IX

YEAR ROUND SECTION SIZE REDUCTIONS vs. LEVEL OF IMBALANCE (MAD) FOR THREE LEVELS OF SECTION SIZE VALUES TRIMESTER PROGRAM 2 ON -1 OFF - 3 STREAMS



When the absolute value of the average section was reduced by approximately 15%, there was a corresponding increase in the present value of total costs. Exhibit IX shows a plot of percent reduction in section sizes versus level of imbalance for three absolute values of average section sizes. The percent allowable reduction in section sizes falls as the absolute values of section size decline.

This occurs because as the absolute value of section sizes decreases, instructional costs and therefore operating costs increase. Capital costs remain constant and are a smaller portion of total costs.

g) A reduction in student retention rates caused a slightly less than proportionate reduction in present value of total costs and had a negligible effect on the critical section size values.

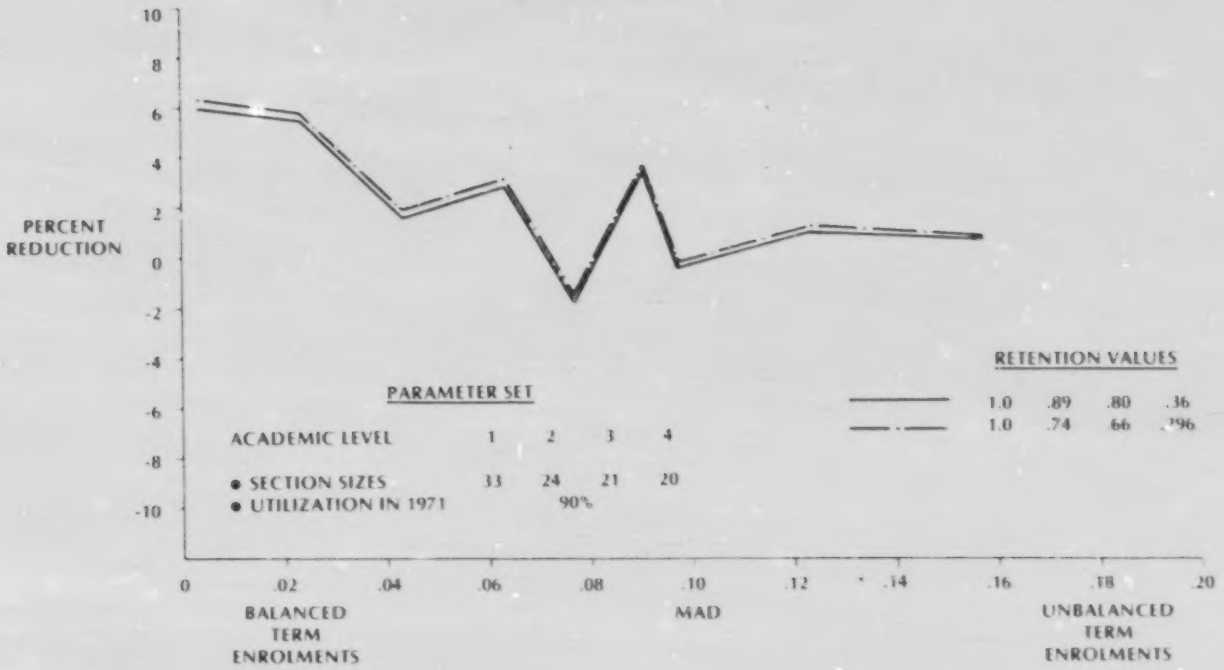
The retention rates were reduced by approximately 17% and another computer run was made to observe the effect on output variables. While the present value of total costs was reduced by approximately 12%, there appeared to be no change in the values of section size reductions. This effect is shown in Exhibit X.

h) A reduction in projected student enrolments caused a proportionate reduction in the present value of total costs for all programs, and did not significantly affect the ranking of the alternatives by cost.

The projected freshman enrolments in years 1972 through 1990 were reduced by 20% to see what the effect

Exhibit X

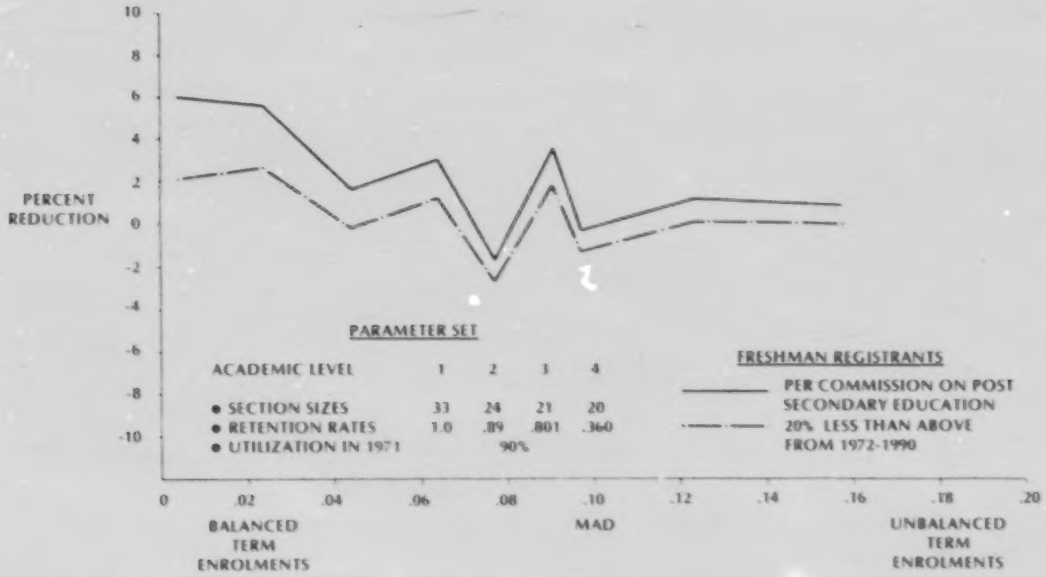
YEAR ROUND SECTION SIZE REDUCTIONS
vs.
LEVEL OF IMBALANCE (MAD)
FOR TWO SETS OF RETENTION RATES
TRIMESTER PROGRAM 2 ON - 1 OFF - 3 STREAMS



would be on the output variables. The enrolment in 1971 was left the same so that comparisons might be made with the present values of total costs derived from the previous runs. The present value of total costs was reduced by approximately 20% for each of the programs and the reduction was slightly lower for the year round operation alternatives than for the standard semester system. This made year round operation slightly less attractive economically than it had appeared with the higher enrolment projections. The smaller reductions in the present value of total costs for the year round alternatives caused the allowable reductions in critical section size values to be less for each imbalance level. This effect is shown in Exhibit XI.

Exhibit XI

YEAR ROUND SECTION SIZE REDUCTIONS
vs.
LEVEL OF IMBALANCE (MAD)
FOR 2 SETS OF FRESHMAN ENROLMENT PROJECTIONS
TRIMESTER PROGRAM 2 ON - 1 OFF - 3 STREAMS



i) A reduction in the net assignable square feet per student caused a much less than proportionate reduction in the present value of total costs and slightly reduced the economic incentive of year round operation.

When the value of net assignable square feet per student was reduced from 130 to 105 (19%), there was a slight reduction in the present value of total costs for all alternatives (1% -2%). The reduction was slightly less for the year round operation alternatives than for the standard semester system because the savings in capital expenditures achieved by year round operation were reduced while the increase in operating expenses remained the same. The effect was to reduce allowable reductions in critical section size values for each imbalance level. This effect is shown in Exhibit XII.

In summary our model shows that the quarter system is an uneconomical alternative to the standard semester system, that only modest savings can be achieved in switching to a trimester system and that for these savings to be realized certain optimum conditions must exist. These include:

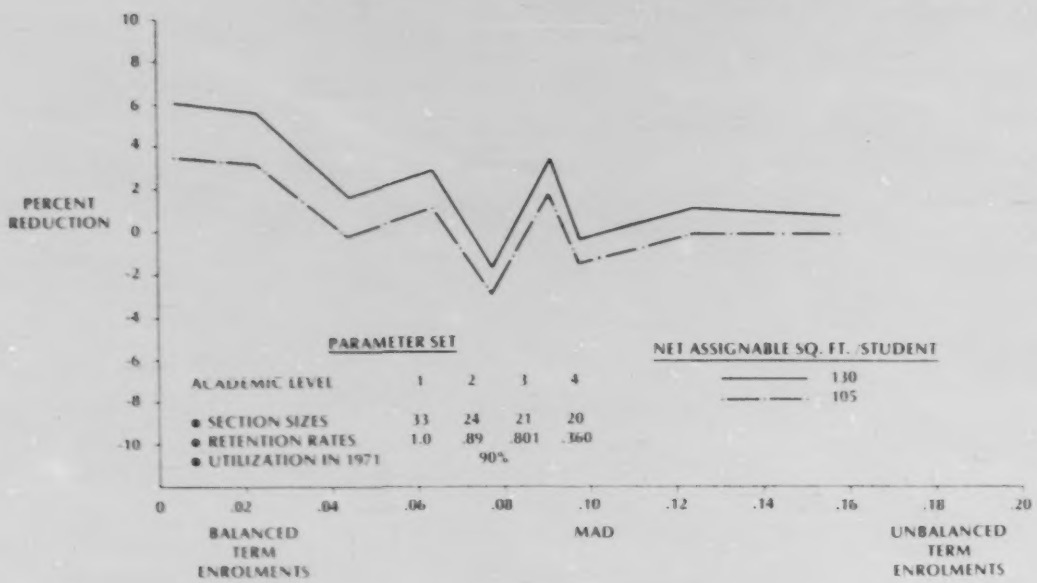
(i) The average section sizes for all classes must be at least at the same level as in the standard two term system. This may be difficult if not impossible to attain without a major alteration of course offerings.

(ii) The physical plant must be presently coping with 75% or more of its potential student capacity under the standard two term plan without a major capital project.

(iii) The total student enrolment must be evenly balanced across the three terms.

Exhibit XII

YEAR ROUND SECTION SIZE REDUCTIONS
VS.
LEVEL OF IMBALANCE (MAD)
FOR 2 VALUES OF NET ASSIGNABLE SQ. FT. PER STUDENT
TRIMESTER PROGRAM 2 ON - 1 OFF - 3 STREAMS



Future Applications of the Computer Model

The computer model developed in this analysis could be used to forecast the economics of year round operation for specific universities and colleges. To do this, a detailed cost analysis for the institution under consideration would have to be made. This would include breaking down costs into defined categories as used in the model, or other categories particular to that institution. Enrolment forecasts would have to be made if none existed, and the effect on these forecasts predicted should the school under study switch to year round operation. Retention rates would have to be determined, not only across academic levels but across departments, to determine if there would be significant changes by department. The model developed for this study used average retention rates for the province which differed only by academic level. Some measure of instructional space utilization would have to be made for the institution under consideration and this could involve a study of class-room use if data were not available. Finally, an analysis would have to be made of course offerings and section sizes. The total number of courses offered as well as the number of multiple sections for each course would have to be determined. Average section sizes by academic level would have to be determined for each department within the school.

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ACCOUNTABILITY: SUBJECTIVE IMPERATIVE

Bernard Trotter and Mario Creet, Queen's University

There are several fuzzy, ambiguous words which have recently become fashionable in the political jargon of education. Accountability is one. Accessibility is another. It would be inaccurate to call these "motherhood" words. Motherhood has, after all, acquired a range of fairly specific connotations. On the other hand, accountability does not by itself communicate any message except that whoever is solemnly using it is solemnly using it. He may know what he means, although he more probably does not.

Our aim here is to discuss several *different kinds* of accountability in operational terms, and to explain why we think it important for institutional research people to be discriminating in the ways they serve the principle. We are not attacking the principle of accountability. We do insist, however, that unless defined and limited, accountability becomes a popular slogan in whose name all can be demanded and nothing resisted. We are especially concerned with two styles often considered valid for *all kinds* of accountability, namely input / output analysis employing measurable outcomes and objective models relying exclusively on quantitative data. In practice, both styles turn out to be an expensive scramble to assemble and analyse quantitative date in ways and at levels inappropriate to any useful application of the principle of accountability. The argument for what we are against usually goes like this: "Universities spend vast sums of public money. The public must be assured of the benefits of this spending. The way to do this is to collect as much numerical data as possible on every aspect of university activities so that the results of this spending can be analysed and then justified or condemned."

Such argument is based on the fundamental assumption that accountability must show that resources (or inputs) are producing intended outcomes. We shall argue that the input / output model of accountability is not only misleading but dangerous when used as a basis for assessing the activities of universities. We shall suggest an alternative style of accountability in which the processes of universities are judged at each successive level in hierarchy of accountability. This style of accountability recognizes the nature of higher education and is, therefore, likely to be more effective than any other. It is a feature of this style that quantitative data and analysis, while important for specific purposes, are subordinate to the role of informed observation. And this means that at each level of accountability the level of statistical detail should be compatible with the ability and opportunity of those judging to observe at first hand and be aware of the extent to which the data fails to describe what happens.

The thrust of our suggestions is implicit in the title of the paper, "Subjective Imperative." We should therefore look for a moment at the contrasting terms "subjective" and objective." We take the term "objective" to mean reference to criteria, standards, facts, which are uniformly true or held to be universally valid, which are external to and unaffected by a particular system of applications. On the other hand, the term "subjective" means reference to criteria, judgements, interpretations which have to be referred to human values or value systems: "subjective" does *not* mean only the personal or the whimsical, nor does it rule out intelligent argument or appeal to relevant objective circumstances.

With these definitions in mind we turn first to the question: why accountability and what is it? Generally speaking, there will always be accountability of some sort where there is an express or implied delegation of power and responsibility. Most institutions, public and private, exercise power and responsibility in order to provide services or perform functions on behalf of groups of people. If they do not perform as they are expected to, the power and responsibility delegated to them may be withdrawn or modified by the delegating group. If there is no delegation certain goals are agreed at least in broad outline.

Assumptions

In relation to educational institutions, it is useful to look at accountability as the process through which mutual confidence between delegator and delegatee is sustained and renewed and which provides, from time to time, the basis on which the terms and purposes of the delegated authority may be altered. This process will rely on much information, non-numerical as well as numerical. Since we are particularly interested in the kinds of information used at each level of the accountability process we have to ask ourselves first: why does public discussion lean so heavily on quantitative analysis of university activities? The

answer lies in the fact that almost everyone, including most institutional researchers applies to universities the assumptions of the input / output model of industrial enterprise. It is easy enough to understand why this should be so. First, we believe so religiously in the market place that even public spending is thought of and tested in terms of marketplace standards. Second, the overwhelming bureaucratic fashion of the past decade has been program budgeting and cost / benefit analysis and it is only human to embrace fashion.

Very simply, the assumption underlying program budgeting is that all public spending programs can and should be organized in the ways pioneered by Alfred Sloan for the industrial process. Industrial firms have to plan and respond to: demand for their outputs, external standards of quality, well understood external regulations, an advancing technology which they (with their competitors) control. In short, the industrial world operates on more or less direct feedback. Although large numbers of people are involved, their activities can be monitored and controlled in relation to specific goals — production outputs and profits.

In other kinds of activities where the human factor is large and outcomes are less quantifiable, feedback is erratic over unknown periods of time and the actions of the people involved are likely to be unpredictable and, more important, uncontrollable. This is particularly true when the delivery of a service involves direct interaction between provider and receiver (as in welfare) or rests on assumptions about the behaviour of provider and receiver (as in warfare). In such instances it is easy enough to see why program budgeting fails. More generally, program budgeting in the public sector fails because it is based on the *hubris* of the social technician who thinks he is — literally — a scientist.

Against this background, we can now dispose of the industrial model so far as universities are concerned, choosing for illustrations one major output — university graduates. Universities can of course plan size and expected output of graduates, not without error, as we are learning, but without disaster. But after noses of different shapes and length have been counted, it is not possible to attach numbers to the output of the university. It is not that the multitudinous outcomes cannot be measured with precision. They cannot be measured at all in any ways that are significant for the process of accountability. The most obvious reasons for this are: first, the outcome of university experience (even if it could be measured for each individual) is spread over too long a period to provide operationally useful feedback; second, the individuals involved are themselves playing a part in changing the social context which determines what is to be judged. In short, the cost / benefit model won't work because most benefits cannot be measured and others cannot be identified (although they may be imagined). To complete the comparison with the industrial model, standards of quality are internal to the university, not external, and they are relative and subjective rather than absolute and objective. Similar arguments can be made about another major output — the research done at universities.

A growing body of literature in diverse fields provides testimony that cost / benefit or input / output approaches have not worked for universities. So far. Many people studying higher education still have an unwavering belief that success is around the corner if only sufficient effort and imagination is applied. Meanwhile, their worship of the "quantitative and objective" has led them to proxies for the benefits and outputs in terms of the inputs; that is most advocates of quantitative models for accountability are in reality using input / input construction. What harm this might do we shall probe after we have described the process of accountability as we see it.

A Hierarchical Model

It is helpful to look at the process as a simple hierarchical model. It further simplifies discussion to concentrate on the primary teaching functions of universities. To make things easier still, we have prepared a table which sets out for each level of accountability specific examples of quantitative and qualitative information which may be relevant at that level. We are assuming that each level is accountable to the level above for making sensible decisions about the resources which have been allocated to it to perform functions which have been implicitly or explicitly delegated to it. In other words, the accountability involved does not mean demonstrating that specified outcomes have been achieved — but that resources have been used effectively in the pursuit of activities which are judged to have worth and value. If we could agree that these activities themselves are the product of the university much misunderstanding could be avoided. In any case it is the activities and not the results of those activities which must be assessed in the accountability process.

We are assuming a university system in which there is almost complete delegation to the institution of responsibility for allocating resources internally and in which funds are provided in a lump sum by means of some more or less objective formula which does not direct internal budgeting. This is the model we know at first hand. While we acknowledge that many others exist in which resource allocation is decided to a greater extent by authorities external to the institution, we would argue that it is both more effective and efficient to make decisions about the interrelated activities of universities at a level where the intricacies can be observed at first hand.

In this hierarchy the most important step in accountability is that of the university to the government. If you examine the detail here you will see a very large number of quantitative items which are developed in-

ternally so that those making allocative decisions do indeed understand the intricacies of the interrelated activities which have to be provided for. You also see a long list of items under the non-quantitative information heading. These all have to do with preferences of faculty and students, advice from professional groups outside the university, peer judgements of quality (and while quality standards are determined internally — external peer judgements are an important factor in the determination of these). In reaching decisions about the allocation of funds to activities, judgements must be made by combining the informed value judgements of a lot of people with the examination of a lot of data to arrive at an institutional judgement. This represents feedback to the budget units and individual professors whose accounting at *their* levels about their stewardship of the resources given to them in the previous years is a key part of the planning, budgeting, evaluating cycle within the institution. The budget formalizes decisions about the ways that powers and responsibilities delegated to budget units and individual professors are to be modified. Such changes will reflect changing priorities about what needs doing as well as changes in methods aimed at improving overall the effectiveness of the instructional process. They may also reflect a judgement that some activities do not meet established internal standards.

LEVELS OF ACCOUNTABILITY

DECISION	KIND OF DECISION	QUANTITATIVE INFORMATION	QUALITATIVE INFORMATION	ACCOUNTABILITY	CRITERIA
				GOVERNMENT TO ELECTORATE	MANPOWER NEEDS; CAREER OPPORTUNITY; SOCIETAL PRIORITIES (INCLUDING QUALITY LEVEL)
1. LEVEL OF SPENDING	GOV'T EXECUTIVE RATIFIED BY LEGISLATURE	NUMBER OF STUDENTS, ACTUAL AND FORECAST; DEGREES; SOCIO-ECONOMIC AND OTHER DISTRIBUTIONS (STUDENTS); AUDITED REPORTS; GLOBAL INDICES.	FORMAL DOCUMENTS - REPORTS AND PLANS; ADVICE OF BUFFER AND PROFESSIONAL GROUPS; PUBLIC POLITICAL DISCOURSE AND FEEDBACK	GOV'T EXECUTIVE TO LEGISLATURE	JURISDICTION-WIDE MATCH TO ABOVE CRITERIA; EQUITY WITHIN THE SYSTEM; PUBLIC SATISFACTION.
2. METHOD OF DISTRIBUTION	GOV'T EXECUTIVE	INTERMITTENT SAMPLING OF COSTS; INTERMITTENT SAMPLING OF FINANCIAL BENEFITS RECEIVED BY STUDENTS.	RECOMMENDATIONS OF BUFFER GROUPS; INPUT FROM PROFESSIONS; ADVICE FROM UNIVERSITIES; STUDENT REQUESTS; WORKING DOCUMENTS OF UNIV.	UNIVERSITIES TO GOVERNMENT	SHORT RUN: ORDERLY SELF-GOVERNMENT AND INTERNAL MANAGEMENT; LONG RUN: DEGREE OF FIT TO SOCIETAL PRIORITIES AND PUBLIC SATISFACTION
3. ALLOCATION WITHIN UNIVERSITIES	UNIVERSITY EXECUTIVE RATIFIED BY BOARD (ADVISED BY SENATE IF BICAMERAL)	ENROLMENT PLANNING, DEPARTMENTAL AND SERVICE BUDGETS, INDICES FOR UNITS (e.g. STAFF STUDENT, AVERAGE COURSE LOAD AND GRADUATES SUPERVISED); UTILIZATION OF CENTRAL RESOURCES (e.g. CLASSROOMS, LIBRARIES); DISTRIBUTIONS OF RESEARCH FUNDS, STUDENT-AID, TECHNOLOGICAL CAPABILITIES.	PRIORITIES ESTABLISHED BY BOARD AND OR SENATE, STUDENT AND FACULTY VIEWS OF TRADE-OFFS (e.g. GOODS VS SERVICES, PREPARATION VS. PARTICIPATION, CHOICE VS. STRUCTURE); RESEARCH POLICY, ADMISSIONS POLICY, METHODS FOR PROVIDING SERVICES AND MAJOR ANCILLARIES.	UNIT TO UNIVERSITY	ACADEMIC STANDARDS, MATCH TO UNIVERSITY ENROLMENT PLAN; STUDENT SATISFACTION; PEER JUDGEMENT.
4. ALLOCATION WITHIN BUDGET UNITS	UNIT EXECUTIVE WITH ADVICE AND OR CONSENSUS	COURSE DETAILS, STAFFING DETAILS, TRADE-OFF ANALYSES, STUDENT PERFORMANCE, ENROLMENT PROJECTIONS.	PEER EVALUATION, INDIVIDUAL PREFERENCES FOR KIND AND STYLE OF TEACHING, AND FOR RESEARCH; STUDENT DEMAND; DEPARTMENTAL TRADITION & ETHOS.		
5. ACTIVITY OF INDIVIDUAL (PROFESSOR)	PERSONAL WITHIN INSTITUTIONAL AND SYSTEM CONSTRAINTS.	TEACHING AND RESEARCH DUTIES; INDIVIDUAL BUDGETS (BOOKS, TRAVEL, COMPUTING, ETC.); RESEARCH GRANTS.	EVALUATION OF AND BY STUDENT; COURSE OBJECTIVES; ANTICIPATED PEER JUDGEMENT; DEPARTMENTAL EXPECTATIONS.	PROFESSOR TO UNIT	PEER JUDGEMENT; STUDENT SATISFACTION; STAFF SATISFACTION.

Data Collection and Its Dangers

In the model of accountability that we propose, very little of the internally generated quantitative data goes forward as part of the university's accountability to government. The government should hold the univerisity accountable for an effective internal system of accountability and very little more. The "more" should of course include audited financial statements and enrolment information, actual and forecast so that adjustments can be made in the interests of a rational jurisdiction-wide system. But, provided that the university is demonstrably discharging its responsibility for effective self-government, higher authorities should forego detailed management information on faculty work-loads, class sizes, contact hours etc. The most frequent reason for wanting such information is to second guess the decisions which have been delegated to the institution. This information is wholly inadequate for the job because the detailed data cannot be interpreted by distant bureaucrats or politicians through the lens of first hand observation. And the second guessing will be based on comparisons with data from other institutions. Since the data will at first not be comparable for the kind of universities we are discussing, government officials then demand comparable data. At this point the need to define and limit the process of accountability assumes crisis proportions. Academic considerations go out the window in favour of pleasing the data collectors and the central authorities who have decided that they have discovered a "right" way to do things. The trade-off here is very clear: an illusion of greater accountability — less effective institutions. The public is encouraged in its natural belief that "objective" measures of performance exist, and that by feeding these back into a resource allocation model something like "perfect combustion" in the system as a whole can be produced.

The chemistry of perfect combustion, if it were not a fantasy, would rely on measurement of what happens to students on the output side and what faculty do on the input side. Because the art of measuring student outcomes is acknowledged to be in its infancy even by those who think it has great potential value, analysis has tended to concentrate on faculty activities and to assume that these can be measured by time spent in doing them. We have already indicated the indebtedness of this idea to industrial methods. What happens when it is applied? Clocking the time spent becomes troublesome because academic activities frequently overlap, such as in "preparation for teaching" and "research" or in "graduate supervision" and "research," and because they are often not comparable, e.g. a "class hour" and a "committee hour." Another oversimplification is that everyone does the same amount of work; an important fact about universities is that faculty members differ greatly in their productivity. In any practical application of the "time spent" measure, these difficulties are glossed over by forcing them into an arbitrary fit. This is the "input" side of the equation. But the time spent is also used as a proxy for the outcome of academic activity, i.e. as a measure of accomplishment. This is the "output" side of the equation. One can understand the emphasis on what professors do because they comprise the most visible and a legislative backlash—not simply against the method, but ask how the money is being spent and how well the job is being done, and to answer both questions by pointing to time spent by professors, because the same information appears on both sides of the cost / benefit equation. So, the assumptions underlying the perfect combustion of resources, that quantitative measures tell the story, that they can be put together to provide analytical reports and objective decisions, lead to statements as compelling as "time spent equals time spent."

In terms of accountability, of course, the results can be damaging as well as fatuous. As soon as authorities in the university or outside indicate that budget decisions are to be made on the basis of scheduled (measurable) time, miraculously the amount of scheduled time increases. In fact it may be both more effective and efficient to reduce scheduled time. Indeed this has been happening in many universities with the object of providing more informal contact between professors and students.

But apart from the possibility of unintended distortions which faculty analysis can produce, there is a larger danger in this and other methodologies which put undue stress on quantitative indicators of performance. The techniques themselves come to be seen as panaceas for all that is thought to be wrong. This leads to expectations of the planning / allocation / accountability cycle which are totally unrealistic and which will, in the long run, produce a legislative backlash – not simply against the method, but against the institutions who helped to create the expectations. It is simply not good enough to say that quantitative analysis is still inadequate, but if we put enough effort into improving the techniques *then* we'll have a truly objective and reliable standard. We will not. But we will have wasted enormous amounts of the taxpayer's money in the process.

Proper Studies

The university's accountability should consist only of demonstrating that it is seriously concerned with making the best use of its resources in its particular circumstances. It may be properly questioned from time to time about particular courses of action but it should not be put in the position of proving that what it has done is "right" or "best" in some absolute sense. Furthermore, those making judgements on behalf of the public should not confuse levels of total expenditure with notions of efficiency and waste. Deciding on "worth" is not the same thing as deciding on "waste." An apparently more expensive choice is not a more wasteful one if a necessary improvement in

quality results.

We will try to put these prescriptions into operational terms. The major element in the accountability of a university to a government would be to show that the university's own internal process of accountability will function effectively. How can a university do this? One way is to make available to the government, or its representative buffer agent, internal communications which show that decisions are being made and are consistent with a real concern for the effective use of public funds. Most such documents are nowadays in the public domain and are prepared for the purpose of informing the university community about the actions of Faculty Boards, Senates, Board of Governors. From time to time these documents will refer to and may even describe fully various quantitative analyses of activities at the university which have been developed to assist judgement in making management decisions. The most useful of these analyses are likely to be fairly simple and they are likely to be most convincing when they make explicit the assumptions upon which they are based. In the form of accountability which we are recommending, however, government or buffer agencies receiving documents of this kind will not attempt to use the data for comparative purposes with other universities. Nor indeed should they use the data for any purpose of their own although it would be perfectly in order for them to draw to the attention of the university any flaws which they detected within the documentation. There is not time or space here to go into detail but studies such as that presented by Irma Halfter on "A Ration Index of Fiscal-Academic Effectiveness" is a good sample of the kind of internal study which demonstrates the right sort of concern for the use of resources. At the same time the university should show that quantitative analysis is a management tool and not a substitute for *judgement*. Responsible procedures for budget making is only part of what needs to be done to convince outside agencies that the university is holding individual departments, agencies and faculties or colleges accountable each in turn. The university must also show a capacity for internal self-criticism and change. Techniques for systematic review of objectives and methods in relation to the use of resources of all kinds including students themselves have been widely developed in the literature of higher education in recent years. Governments and buffer agencies will want to be increasingly alert to evidence that universities are applying systematic methods to analyse the correspondence between stated objectives and actual objectives. As a corollary universities should be prepared to show that they have found effective ways of helping individuals attempting innovation to offset the conservatism of their faculties. The university that is truly accountable will be able to show that careful husbandry does not depend on stagnation.

Finally, institutional research can play an important part in the credibility of a university's accounting. In some cases, universities have invested heavily in institutional research not because they believed in its practical value, but because they thought it would make a good impression on their political masters and the public at large and because it was a good thing in itself. It is becoming clear that university administrations and institutional researchers, and even more government departments, need to apply to their own rapidly expanding empires the rigorous systems analysis which they insist should be applied to general institutional decisions. The institutional researcher who would serve his institution and the public interest best is one who asks before embarking on each project—what question am I trying to answer? Is the answer going to be worth the cost? Can I get an approximate answer from data I already have? What does my data leave out? People who use institutional research must remember that educational planning and administration and teaching all involve the continual interpretation of values—and they must hold on to a confident capacity for judgement. Otherwise the search for numbers in place of judgement may end with losing the ability and the right to judge.

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INSTITUTIONAL ACCOUNTABILITY — CONCEPT, DOGMA AND REALITY

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Underlying most of the current agitation over accountability is a profoundly important struggle for influence over if not outright control of our colleges and universities. That struggle is the *reality* we are dealing with: a reality, however, which is masked from view by much evasive rhetoric both within and without the academy. In order to remove some of the obscurities which are hampering our perception, I shall construct and apply some rudimentary *conceptual lenses*, by the aid of which I hope we may command a clearer view of certain of the problems besetting us. In particular, it will be necessary to examine the role of certain *dogmas* — and myths — which are ingredients in the situation we confront.

I shall, in part, be sermonizing; and my text is taken from Lewis Carroll's *Alice in Wonderland*. You may recall from that story the remarkable powers and propensities of the Cheshire-Cat — in particular, his ability to disappear, leaving behind only his grin. Bothered by the habits of this strange creature, Alice asks him to perform this feat once more:

> "All right," said the Cat, and this time it vanished quite slowly, beginning with the end of the tail, and ending with the grin, which remained some time after the rest of it had gone.[1]

Current Demands on the University

Let me begin my sermon by reminding ourselves, very briefly, of the truly astounding demands currently being made upon the contemporary university: in particular, upon the large, complex, highly visible, highly differentiated "multi-versity" or its even more fearsome cousin "the mega-versity," vis., the state-wide college and university system.

There is a compact and useful summary of these demands in the 1972 Wiche report, with which many of us will be familiar.[2] As the Report correctly indicates (and it is merely summarizing) we are being admonished to "achieve higher productivity" in our educational enterprise; to "attain greater efficiency;" to end "wasteful and unnecessary duplication;" to get on with the job of "measuring outcomes;" to demonstrate the "value added" component in the educational process; to be more "relevant;" to develop and foster "continuing education" (in addition to our existing programs); to be more "open" and "accessible," especially to "disadvantaged minorities;" to "end the abuses of tenure;" to "eliminate deadwood;" to strive for "flexibility" and to abandon "rigidity;" and, at all times, to be fully "accountable" — to — "government," to "society," and to the "public" at large. (By some fortunate omission of dispensation we are, apparently, *not* required also to be accountable to God and to the Queen.)

"Accountability" as the Chosen Instrument of Persuasion

I shall not spend any time reviewing in detail this set of ten or more demands. We are all too familiar with them. Rather, I shall fasten on the term "accountability" — which, as Howard Bowen has aptly said, is now functioning as "the chosen instrument of persuasion."[3] It may be noted that this term does not even appear as a topic in the *Education Index* prior to 1970.[4] Yet it now figures as a prominent theme in a veritable flood of rhetoric: newspaper editorials and government pronouncements invariably invoke it. Prior to 1970, it was used to refer essentially to matters of fiduciary obligation. Now it is functioning as a shibboleth, or as a war-cry; or, to change analogies, as a term of incantation to rid the world (and especially the academic world) of all sorts of presumed monsters and devils.

Like other currently popular terms (such as "relevance," "alienation," "identity crisis," "participatory democracy," and so forth) "accountability" is a kind of code word or trigger word for an extremely complex, subtle and shifting array of phenomena, of ideas, and above all of attitudinal stances or values. Depending upon their users and their contexts, words of this type shift in elusive fashion, both in their denotation and their connotation. As heavily value-laden terms, they are most convenient instruments of indictment and of attack. Declare yourselves "alienated;" label Classics as "irrelevant;" accuse your department chairman of being "undemocratic" and "authoritarian" — and you can nowadays put in train a set of emotions and attitudes which are most useful as engines of subversion and disruption of whatever "establishment" or *ancien regime* you wish to pull down. No impediment stands in your way: who nowadays will be so crass and ill-mannered as to hold you accountable for the meaning and

use of your words? — especially if you choose to talk of "accountability." It is indeed a "chosen instrument of persuasion." More bluntly: it is being used as a club.

Let me avoid a misunderstanding here. I do not wish to argue that none of the demands being made upon us is legitimate. Nor do I wish to suggest that the attacks being made upon us are wholly without reason and foundation. We should be concerned, however, about the weight of all of these demands, when summed, upon our institutions of higher education. It is calamitous for anyone to require the university, or any institution, to perform tasks it simply cannot do — unless his aim is to distort and break it.[5] What is also of concern is that in this current list of demands there is no reference to the tasks which the university is uniquely fitted to perform, has (despite its faults) historically performed, and which no other institution does or can perform. Undiscriminating attack may not *reform* the university; it is more likely merely to *deform* it.

Reality I: The Malaise of the Contemporary University

But is the typical multi-versity in good position to respond to these demands as it should? Is it capable, in other words, of resisting those demands which should be resisted, and satisfying those demands which are legitimate? Is it capable of responding in a coherent, systematic and rational manner? No one familiar with our present condition could give a confident reply.

I do not have the time to dwell very long in painting a picture of the profound malaise affecting so many of our institutions of higher education.[6] It is obvious to all, and now a commonplace of many reflections, that over the last ten years or so we have undergone most profound changes. For example, participation in something called "university governance" has altered dramatically in the past decade. In many jurisdictions academic staff, students, and occasionally members of the support staff now sit on the highest boards or governing councils. Decision-making by "consensus," by "participation," instead of by authoritative *fiat* is the order of the day.[7] Yet everyone is disenchanted with this grand experiment in democratic governance. The New Jerusalem has not materialized. Everyone goes fruitlessly about trying to find the real locus of power: surely it must exist somewhere? Our students and the majority of our younger faculty are convinced that they do not have an effective share in power, despite their enfranchisement; and both are quite correct in this assessment. "Button, button, who's got the button?" they ask in frustration. They are naively convinced that something called "the administration" must have the button of power. Here they are quite wrong: there is no button.

Power has been dispersed everywhere — and therefore is effectively nowhere. "The problem is not concentration of power but its dispersion. Inertia, incapacity to respond, is the inevitable outcome."[8] No longer do we have, in any genuine sense, a *system*; we have only what one of my academic colleagues aptly calls "this crazily juddering heap."[9] The old "community" has dissolved into *adversary* relationships; we have moved (to quote Nisbet) from legitimacy to litigation.[10]

A useful way of highlighting this absence of coherence or of system is to consider the quite incredible array of *models* through which the various protagonists in the struggle for ownership and mastery of the university want to see (and persuade others to see) our institutions of higher education. At times, some remnants of our foundation model come into play: the model of the guild of scholars, a model, as Nisbet's magisterial analysis shows, rooted in an essentially mediaeval context. This is the model which sets in play much of the rhetoric about "the community of scholars," "university autonomy," the "sanctity of tenure," and like phrases.

But other models are not wanting. There is the consumer sovereignty model; the public utility model; the social service station model; the model of the university as "therapeutic community," functioning as a sort of "psychiatric day hospital;"[11] the corporate model; and a variety of political models. These diverse models (or relevant portions of them) play like magnets over the elements of the whole, aligning them now in this array, now in that, but with no magnet possessing sufficient intrinsic power to override the attractions of the competing magnets so as to impose and maintain any coherent, permanent recognizable pattern or system. In the accurate usage of mathematics, the university of today appears to be approaching "the degenerate case;" i.e., to be in danger of losing those characteristics proper to its genus or nature. Power to respond in a rational and coherent way to the forces acting upon us in the name of "accountability" is becoming small or nonexistent.

Conceptual and Linguistic Pollution — and its Effects

The university is by no means wholly responsible for the condition in which it now finds itself. It has been caught, willy-nilly, in a vortex of social, economic and political forces which are in large part not of its own making. Yet we are not wholly guiltless either, for the process of dissolution has been aided and abetted from within the academy itself. We have permitted our intellectual and linguistic coinage to become debased. Or, to borrow terms from the realm of ecology, just as our physical environment has suffered pollution from our abuse of it, so has our intellectual environment suffered a corresponding decay and pollution. And that is something which should not have happened in the academy, of all places.

The fact is that we see our environment through words and concepts — and we *act* on it in terms of what

we see. When some one coins a striking word, we see things differently, and we then respond differently. Once a term like "identity crisis" becomes established, adolescents start *having* "identity crises" — by the millions. Allow words and concepts to become muddled and slovenly, so that the lenses through which we see become clouded and dirty, and we shall soon begin to stumble and to act foolishly.

Let me illustrate — by reference to the context of university affairs. I am rather confident that a generation ago we did not go around talking of the problem of "university governance." Very unfortunately, that phrase was not smothered in its cradle: it was permitted to grow and to acquire undue influence over our vocabulary. By insensible degrees, we then began to speak of "the administration," using the term to embrace such offices as those of president or principal, dean and department head. We thereby (quite unconsciously slipped into two serious errors. In the first place, we began to obliterate the former clear distinction between (say) heads and deans on the one hand and comptrollers and similar functionaries on the other. Secondly, under the influence of bad analogy, we began to speak and to think of all these "administrators" as clerks or "civil servants" — a change not muted in significance by insisting on the (relatively trivial) distinction that some civil servants are more senior than others. Logic (of a sort) now carries us on to the denouement, wherein we find "academics" asserting that these mere "administrators" (are they not only civil servants?) should be excluded from any real influence of senates or boards of trustees. Surely this is Alice in Blunderland? Somewhere along the line, we have quite forgotten that any institution requires *leaders*. Indeed, words such as "leadership" and "authority" have now acquired such an odour as almost to be unmentionable in polite academic society: one must apologize for using them. The "anti-leadership vaccine" of which John Gardner wrote so perceptively seems to have done its work only too well.[12]

I am not here engaging in any fruitless exercise in nostalgia. (As the wry *graffito* has it, nostalgia is not what it used to be.) I am simply recalling that, a generation ago or even less, the university was embodied in its heads, its deans, its principal or president. Those office-holders spoke for the university; they were (or were taken to be) exemplars in their own persons of what the university was *for*. They were the moulders and makers of the university; they were responsible for its nurture and its growth.

In a word, they were the *authorities*. In a precise language such as Latin, they would have been called *auctors*. *Auctor* is related to *auctoritas*, "authority;" and both are related to the verb *augeo*, "to cause to grow or increase." In our slovenly modern manner of speaking and thinking, we have lost both the word and the concept. In the ensuing development, we have, quite naturally, lost our authorities, our "makers." Of "un-makers," of destroyers, we clearly have a plenitude. Authentic decision-making becomes more and more difficult. Here and elsewhere, within the university and without the paramount problem is the *unmaking of indecision*.[13]

"Accountability" — Some Conceptual Clean-Up

In destroying authority, we have simultaneously destroyed the necessary conditions of accountability. You cannot talk meaningfully about accountability without talking about authority. The notion of accountability *entails* the notion of authority, of a structuring of "offices" within some juridical or institutional framework. Yet many of those who insist on more of the former are doing their best to ensure that there is steadily less of the latter.

What, in standard English, is the meaning of "accountability?" Consider some office-holder, X; for example, a faculty dean. If X is to be held accountable for the discharge of some duty or trust, then there must be some second person (or body) *Y*, (e.g., the president) who can "call X to account;" that is, who can demand that X justify what he has done or has failed to do. If X refuses to give such an account, or if Y finds his account wanting in some respect, then Y is empowered to inflict upon X an appropriate penalty or "sanction," or to request some other authority to do so. In plain English: the dean can be fired. Remove such notions as "sanctions" and "authority" and you remove all meaningful talk about accountability. We may put this in another way. Impose accountability while at the same time destroying authority, and (if you are so minded) you have at your disposal an admirable engine for destroying the bonds which hold an institution together, which make it a system.[14]

To give force to these comments, let me contrast two very different contexts for decision-making. Let us first imagine some office-holder, X, operating in a well-structured system, who makes (in responsible fashion) a decision likely to create some painful consequences. Some of the shocks flowing from that decision will inevitably recoil on him. The action is *reflexive*: for the action, there is a re-action, as the first law of Newton assures us there always must be. If he has made a mistake, he is not only blameworthy; he will get the blame or receive the penalty in his own person. When blame can be fixed in this way, accountability is present. X's action and role are *system-conserving*.

Suppose, secondly, a committee (not an individual office-holder) is called upon to make the decision. Immediately we are in difficulties. Unless we blandly reify the committee, there are notable difficulties even in speaking of an action and therefore a decision at all. A vote can of course be taken; it may even be unanimous; but there may in practice be as many reasons, all different, as there are members of the committee. There may be complete formal consensus as to the motion, but complete

dissensus as to the rationale. Accountability immediately begins to come unstuck, because there is no authoriative way even of providing an account of the action.

A second difficulty is that the necessary condition of a sanction is removed. In a loose sense the committee can be "blamed;" but there may well be no way, short of executing the whole lot, of bringing a sanction to bear on a collective or on its members. The action is not reflexive: blame can never be fixed upon any individual member of a committee. Even if it could, what appropriate sanction is available? Being fired from a committee, as we all very well know, is no sanction at all. Even if sanctions could be devised, by the time the adverse consequences appear the committee's membership is very likely to have changed. Or the committee may even have ceased to exist. It is about as useful to blame a committee as to blame the hurricane for destroying your house. To say that the committee "acted" or is "accountable" is to begin to use words in a degenerate or Pickwickian sense. Relying on committees for advice is prudent; relying on them for decision-making is not system-conserving but *system-destroying*.

The Masked and the Masking Game

The realities of our situation in the face of the demands of accountability — even the legitimate, not the spurious demands — are not particularly reassuring to contemplate. For several reasons we tend to conceal these realities in fogs of various kinds. How and why do we do this?

Let me begin with a very simple example — one no doubt recognizable to all who have seen academe in action. The Faculty of Arts at Puddleberry University is engaged in the throes of its quinquennial debate about the curriculum for the Arts degree. The Department of Outer Mongolian Language and Literature does not have quite the strangle hold on the curriculum which it enjoyed at the time of Puddleberry's founding. Some bold spirits in the Department of Ideology have therefore advanced the proposition that OM 200 should henceforth not be required for the degree. That motion is the *formal* agenda for the meeting of the Faculty Council.

Professor Hapless, Head of Outer Mongolian, will have to repel this thrust of the barbarians against the ramparts of high culture. Everyone but a babe in arms knows that Hapless (is he not human, like the rest of us?) is vitally concerned about losing student credit hours (should students be allowed to vote with their feet); academic and support staff entitlements; resources of other kinds. His status and clout in the Faculty are at stake. The struggle at the Faculty Council between Hapless and the ideologists over these matters constitutes "the hidden agenda" — a phrase now a commonplace.

Can Hapless address himself to the real or the hidden agenda? Obviously not. The unfortunate man is forced to enter upon a debate about the intrinsic merits, high educational values, etc., of OM 200. He must disavow any self-interest in the issue, and advance arguments of a personally disinterested, moral and rational type, addressed to some shared (or once shared) concept of the mission of the Arts Faculty of Puddleberry University. Given these constraints, Professor Hapless clearly has a formidable assignment in front of him; and smart betting is that he will lose.

At this point I want to introduce the notion of a *game*. I shall not depart from the standard dictionary definition of a game as "a contest played according to rules and decided by skill, strength or luck." That is a simple enough definition. There is, however, an incredible variety of games, depending upon the kinds of skill, strength or luck at issue and upon the pertinent rules; and full exploration of the concept is a most demanding task.[15] Here I shall have to avoid complications, noting only that we make everyday use of the word in talking about the actions and behaviour of others. "What's his game?" "What's the name of the game?" are two obvious examples.

I shall call the "hidden agenda" the hidden or *the masked game*. In its crudest form, the masked game is concerned with the simple question: "What is best for me?" Professor Hapless, however, is forced by a certain set of rules to play another game, which covers up this somewhat unpleasant, naked reality. Let us call this second game *the masking game*.

The masking game always has a standard form. Its detailed content will vary with the context. The standard form is: "What is best?" or "What is best for . . .?" where the blank may be filled by designating any group or any cause transcending patently "selfish" concerns. "What is best for the students of Puddleberry?" is a move open to Professor Hapless. What is best for the nation? for the Party? for the Revolution? are other possible fillings for the basic form. The essential feature is that within the masking game, we must always set in play *some admixture of the moral and the rational*.

Everyone, including Hapless, is aware that he is playing the same game — a fact not concealed from themselves, their audience, or from Hapless. (We may be confident, for instance, that they will be engaging in much talk about "relevance" as a mask for their real interests.) Why then all the pretence? Why does not Hapless simply stand up in the Faculty Council and state his real concerns? The answer is that this option is simply not open to him. If he were to drop the mask, and admit to his real game, no one else would play with him. There are severe penalties for dropping out of the masking game. To refuse to play by the rules and constraints of that game is *either* to leave or to take on the whole organization or institution of which he is a member. Almost certainly Hapless cannot afford to opt for either alternative. He is therefore forced to play, with

the big guns of "relevence" trained straight on him.

If you think that I am going to condemn the masking game, you are quite wrong. It is only the extreme and degererate case of the game that I shall condemn. In fact, playing the masking game (as I have defined it) is an inescapable and essential feature of the human situation. Aristotle put it succinctly when he laid down the fundamental proposition that *by nature* all men are "political" or social beings. We are neither beasts nor gods; we are halfway between. We are not driven merely by brute instincts for survival. Nor are we like the gods — perfectly moral, rational beings. We are in a middle condition; and we are forced to live within the bonds of some society or association. Self-interest must be curbed, muted, disciplined by moral and rational considerations if that society is to endure. In our discourse with one another we must put on the mask of morlity and rationality.

Certainly, the masked game influences, perhaps distorts, the play within the masking game. (Some moves are just not available to Professor Hapless.) But equally, the masking game moderates the play of narrow self-interest, which is the name of the hidden or masked game. In a healthy, genuine community, the two games interact. The mask modifies its wearer. Your three year old child does more than merely don the Halloween mask of the witch: for that magic hour she *is* a witch. The mask or *persona* modifies the person: *persona*, indeed, originally meant the mask of the actor in the play. The role called for by the mask changes us, a fact noted long ago by William James in his *Principles of Psychology*. Assuming a virtue when we have it not is the necessary first step in practising the virtue — and therefore in coming eventually to possess it.

"Valence Bonds" — and the Sustaining Dogma

The elements of any viable organization are held together by certain "valence bonds" — by certain values. The masking game must appeal to those value bonds; as long as it does so it is a necessary and indeed value-reinforcing activity.

Those values will be found to be embedded in a central, sustaining doctrine or set of fundamental beliefs held as valid, and functioning as dominant and unquestionable for the particular organization. Such a doctrine is a *dogma*. No doubt at some time Puddleberry had a local and compelling version of the doctrine of the community of scholars; and that unquestioned doctrine with its associated values and beliefs conferred rights and status upon certain central disciplines and their professors. As long as the sustaining dogma remains strong, the barbarians will probably not dare to invade the realm of Outer Mongolia. They will indulge only in reconnaissance forays. But once weakness is scented, they will attack. That is why, sooner or later, Hapless is bound to lose. Life has already fled from the sustaining central dogma. The case of Hapless is hopeless: avoid him at all costs.

What happens when an organization begins to crumble? when its core of values starts to dissolve and the valence bonds to loosen? when community is replaced by adversary relationships and new power alignments? when an institution loses those qualities proper to its nature, i.e., when it approaches degeneracy? Then the masking game itself becomes degenerate. The moral and rational dialogue forced upon us by the rules of the masking game ceases to tame and to mute self-interest and partisanship. The sustaining myth or dogma may eventually come to be used in the most cynical manner by the contending factions.

Consider, by way of example, the classic description of the university as a "community of scholars." Perhaps there was a time when in most if not all places that expression denoted a genuine reality. No doubt there are places where it still does. As applied to the typical large, modern, urban multiversity, however, the use of the expression now makes one distinctly uncomfortable — if taken as a reference to a governing reality. As one acerbic writer puts it, most debates about "university governance" are "part of a fantasy about the existence of 'community.' But large urban campuses have about as much community as Grand Central Station."[16] The expression in such contexts denotes a mere fiction: in current usage of the term, a *myth*. And its use in the masking game may become more and more cynical and unprincipled.

For example, over the last few years in many institutions the "community of scholars" argument has been used: (i) by the faculty, to wrest power from the "administration" and from the board of governors or trustees; (ii) by faculty, with the administration as opponent and the board as ally or neutral; (iii) by students, with the faculty as opponents; (iv) by students and faculty, with administration and board as opponents; and so on through still other game combinations. Recently, at my own institution (perhaps others?) the local faculty association made an interesting external use of the myth — a use which some of my academic colleagues have found somewhat cynical. Applying to the provincial Labour Relations Board for formal certification as a union, they claimed in their application the president, the academic vice-presidents, and all deans as members of the union on the ground that since all were members of a "community of scholars" all had that true community of interest into which the Labour Board is bound by statute to inquire. The contradiction is obvious: if we are all members of a *community*, what are any of us doing at the Labour Relations Board — whose role essentially is to organize the fight?

Reality II: The Accountability Interface

Thus far I have been talking about the *institutional*

scene, and noting the conditions which tend to defeat accountability within the multi-versity. Some brief comments about the *interface* between the university and the government are now in order. Here too we find a masking of reality which is causing serious if not intractable difficulties for those who have to plan and manage ("manage" is now the operative word) our colleges and universities.

Governments nowadays are fond of posturing champions of "accessibility;" as enemies of "elitism;" as true believers in full "self-realization" through education for all citizens of the state; as committed adherents of "participatory democracy," "openness of decision-making," and the like.

But what is the reality? It is a commonplace that every good medical school on this continent is turning away five, six, ten, twenty or more well-qualified applicants for every student admitted. We admit only a highly selected group; not to mince words, an *elite*. We may fairly suppose that many of those rejected would have found genuine self-realization in a career in Medicine — to say nothing of the fact that they are also badly needed. But ask the government to fund you at a level which will permit you to treble or quadruple your medical faculty intake, and the talk about universal accessibility is suddenly turned off. It turns out that governments are interested in accessibility *at a price*; and that they are unwilling to pay the full price of universal accessibility. There are hidden or masked constraints on their allegiance to "accessibility." As for open decision-making, one has yet to hear of the party caucus or the government cabinet being thrown open to the press. The realities of political competition simply rule that out. Governments, again, insist that they believe in efficiency and productivity — while their civil service rolls expand every year at astonishing rates. Yet universities are considered fair game for all those demands we noted at the outset which are embedded in the popular cry for "accountability."

I am not here trying to belabour governments: right now, most democratic governments are struggling with a host of perhaps unmanageable problems and are in a case as sad as that of the multiversities. Faith in our institutions generally is badly eroded. I am merely trying to indicate that cant and hypocrisy are by no means the private preserve of academe. Governments also play — and of necessity — the masking game; and in our own legitimate interests and that of our institutions of higher education it is high time to start saying so.

Conclusion

Let me review and conclude. I have been arguing that the university is generally in poor condition to respond to the demand for accountability, even where that demand may be legitimate and not merely a club to beat us into submission. For this condition there are many causes: some inner, some outer. One pervasive cause is that the rapid growth forced upon us in the decade of the sixties was too much for any organization to cope with. As Sir Eric Ashby has wisely remarked, it is the experience of a biologist that large mutations are invariably lethal: the same law applies to social organizations.[17]

Whatever the causes, much of the substance of the old order has vanished. Let me now advert to *Alice in Wonderland* and modify our text by one word only:

> "All right," said the University, and this time it vanished quite slowly, beginning with the end of the tail, and ending with the grin, which remained some time after the rest of it had gone.

Unlike the Cheshire-Cat, however, we cannot reappear.

What, then, is to be done? No short, easy answers to difficult problems can be expected. People who have the answers, one finds, usually don't have the problems. The simple mentality of the Queen of Hearts, for whom the command "Off with his head!" was the recipe in all difficult cases, will not suffice.

What we face is a long and difficult task of reconstruction. And one of the first essentials is to start talking with much greater candour about our present situation. As long as we persist in presenting ourselves to the public as an autonomous community of purely rational, disinterested, high-minded scholars, dedicated only to truth, governing ourselves in dispassionate and efficient fashion, we are going to be in trouble. The public will naturally (and rightly) wonder why, if that is the case, we cannot order our affairs in better fashion. As Warren Bennis has noted, all of our institutions — including the university — are facing an increasing credibility gap. Lack of candour, he suggests, fosters "the adversary culture;" and moreover "has a devastating impact on the effectiveness and morality of our institutions."[18]

Some of the outlines of the future are very dim. Others, I think, are tolerably clear. There is a well-known law that as society evolves, its members tend to move from a condition of *status* to one of *contract*. No longer can we talk, as philosophers of a previous generation did, about "my station and its duties". The movement from status to contract has now caught up with the university. We are at the end of an era; and in our reconstruction we shall probably have to build upon new contractual bases of which faculty unionization, now the focus of so much interest, may well be typical. In any event, it is quite certain that much of what we have known and valued is going to pass away, if it is not already gone. With proper leadership and resolution, however, we should be able to salvage something of the central core of our tradition and values.

Only, however, on the condition that we examine

ourselves more critically and address ourselves more vigorously to repudiating outworn myth and dogma. It was Socrates who said that the unexamined life is not worth living. My addendum is more modest: it is also just too dangerous.

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[1] *Alice in Wonderland*, Chapter VI.

[2] *Annual Report, 1972*, Western Interstate Commission on Higher Education (P.O. Drawer P, Boulder, Colorado, 1973), pp. 2-3.

[3] Bowen, H.R. "Holding Colleges Accountable." *Chronicle of Higher Education*, Vol. VII, No. 23, (March 12, 1973), p. 28.

[4] Mortimer, K.P. "Accountability in Higher Education." ERIC Clearinghouse on Education, Vol. 1, 1972, p. 47.

[5] See Annan, Noel. "What are Universities For, Anyway?" *The Listener*, Vol. 88, No. 2275, (November 2, 1972), pp. 597-600.

[6] The malaise is accompanied by a crisis of confidence. It is only fair — and important — to note that confidence in other institutions is similarly eroded. Over the last five years the erosion has indeed been precipitous, as pointed out by Harold L. Hodgkinson in his address to the 1972 Forum of the Association. (See Hodgkinson, H.L., "Open Access — A Clue to Reformation and Reallocation:" in *Reformation and Reallocation in Higher Education*, 12th Annual Forum of the Association for Institutional Research, (1972), pp. 10-16.)

[7] For a most illuminating discussion of the possibilities — and of the very great theoretical and practical difficulties lying in the way — of participatory modes of government, see the "curriculum essay" by David K. Hart, "Theories of Government Related to Decentralization and Citizen Participation," in the special issue of *Public Administration Review*, Vol. XXXII, (October, 1972), pp. 603-621.

[8] Sibley, W.M. "Accountability and the University: Is Whirl to be King?" *Stoa*, (Journal of the Canadian Society for the Study of Higher Education), Vol. 2, No. 2, (1972), p. 10.

[9] Carney, T.F. "Towards 1984." Unpublished submission specially commissioned by the Bonneau-Corry Commission on the Rationalization of University Research in Canada (1970), p. 42.

[10] Nisbet, Robert, *The Degradation of the Academic Dogma*, (New York: Basic Books, Inc., 1971), pp. 43-44 and 137-138.

[11] See Vann, Carl R. and Singer, Philip. "The University as Therapeutic Community." *Change*, Vol. 4, No. 5, (June, 1972), pp. 6 and 58-59.

[12] Gardner, John. "The Antileadership Vaccine." *1965 Annual Report*, Carnegie Corporation of New York.

[13] I owe the phrase to Professor T.F. Carney, of the Department of History, University of Manitoba.

[14] For further development of the concepts, see the writer's article in *Stoa*, cited above.

[15] Ludwig Wittgenstein's *Philosophical Investigations* is a most powerful and influential exploitation of the concept of the game, in the field of Philosophy. For an example of the influence of Wittgenstein's treatment of games in the field of political science, see the penetrating and impressive study by G.T. Allison, *Essence of Decision* (Little, Brown and Co., Boston, 1971), particularly at the level of development of his third "analytic paradigm" in Chapters 5 and ff.

[16] Goodfriend, H.J. "The University as a Public Utility." *Change*, Vol. 5, No. 2 (March, 1973), p. 62.

[17] Ashby, Sir Eric, as quoted in *Change*, Vol. 5, No. 1, (February, 1973), pp. 22-25. (The reference is to Ashby's *Any Person, Any Study* (McGraw-Hill, 1971).

[18] Bennis, Warren, *The Leaning Ivory Tower*, (Jossey-Bass: San Francisco, Washington, London, 1973), p. 13. (See also Bennis' incisive comments about the difference between "administration" and "leadership," and his penetrating remarks about the serious obstacles to genuine leadership in the contemporary university, at pp. 82-84.)

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THE INSTITUTIONAL RESEARCH IMPERATIVE AT EMPIRE STATE COLLEGE

A. Paul Bradley, Jr., and Ernest G. Palola, Empire State College

Seldom in higher education has a college or a university received at founding a mandate to conduct large-scale institutional research and to use findings for improving institutional functioning. In fact, even at existing colleges and universities, institutional research is often a low priority indeed. The new, nontraditional college of arts and science of the State University of New York is a notable exception, for, at Empire State College, research and evaluation claims equal status to the other key institutional functions. This paper will give an overview of Empire State College, discuss the rationale for institutional research, and outline the projected research and evaluation program.

Overview of Empire State College

Empire State College is to serve as an alternative to the traditional institutions of New York State. It represents a " . . .statewide commitment to test and experiment with new, flexible, and individualized modes of learning."[1] Because of this charge, Empire probably has more unusual features than any other single institution in the United States or Canada.

Empire is a college without campus. Instead, the institution utilizes a statewide network of mechanisms for reaching students. The most prominent mechanism is the regional learning center which generally has a dean, an associate dean, an assistant dean, and thirteen to sixteen mentors covering a variety of disciplines, though other staffing patterns also exist. Currently, there are regional learning centers in Albany, Rochester, Manhattan, and Long Island (Old Westbury). By 1974-75, the College intends to complete statewide coverage with the addition of centers in the lower Hudson area, in western New York, in the southern tier, and in central New York.

Regional learning centers are the primary administrative and academic loci for planning and fulfilling student programs of study. Operating year-round, they have responsibility for developing and extending various educational services throughout their entire regions. In doing this, centers will increasingly find it convenient to establish satellites at such locations as public and private colleges, museums, industrial plants, prisons, community centers, churches, and governmental agencies. Satellites help Empire State College go to the students and will be expanded or discontinued as student need and demand require.

The overall administration of Empire State College is located at the Coordinating Center in Saratoga Springs. There the President, the Vice Presidents, and their staffs supervise the formulation and administration of college-wide academic, fiscal, personnel, and facilities policies in consultation with the deans and faculty.

The idea of Empire State College requires that faculty seek ways to provide study opportunities in response to student's individualized purposes, interests, and needs. Furthermore, the College is to use the variety of learning resources that exist in the State rather than duplicate existing resources. This translates into essentially three modes of learning: the mentor mode, the adjunct mode, and the organized program mode. In the mentor mode, students come to the regional learning centers or satellites and meet face-to-face with faculty (called mentors). Together the mentor and student develop and implement an individualized program of study built on a series of learning contracts. These programs of study may involve elements of the adjunct mode: field studies, tutors, regular courses at other colleges and universities, work study opportunities, internships, and the like. It also may involve use of organized programs which are self-study modules developed by the Learning Resources Faculty, a high-powered group of scholars recruited both nationally and from the regional centers and housed in Saratoga. These organized programs can be used by students who have mentors and by students who wish to work independently.

Another specific element of the Empire State College idea is that students be granted significant amounts of advanced standing on the basis of prior learning. This learning may have come about in formal academic situations or simply through the experiences of a lifetime. Students document their learning in autobiographical portfolios which are assessed at the regional learning centers

and the Coordinating Center. Currently, a student can earn up to five-sixth's of his degree on the basis of prior learning.

Rationale for Research and Evaluation at Empire State College

One of the early decisions made at Empire State was to have a strong internal research and evaluation program. Such external groups as accreditation commissions and the larger educational consultant firms could and may eventually conduct a number of useful studies. However, a common theme in relevant literature is that internal research programs have advantages over external research programs in promoting organizational change. As Burns and Stalker[2] and Lawrence and Losch[3] point out, the structure of organization should be contingent upon the nature of the organizational environment. For Empire State's dynamic environment, Peterson[4] would draw upon these studies and recommend an active internal research office to provide systematic and regular input to the decision making process. Important to this argument is the notion of acceptance of results. Before they will promote change, decision-makers must "internalize"[5] the need for it. Achieving this can be difficult so Bennis recommends that ". . . the more profound and anxiety-producing the change, the more a collaborative and close relationship is required."[6] French and Raven[7] would agree, noting "referent-power"— identification with a person's viewpoint because of feeling for and understanding of that person — is a likely outgrowth of regular interaction. Thus, as an integral part of and a regular contributor to the decision-making process, the research and evaluation program at Empire State should play a vital part in the future development of the College.

A second reason for having a strong research and evaluation program at ESC is the great interest in the incomplete but evolving plans and programs of Empire State College. Students, faculty, ESC administrators, State University administrators, legislators, high school guidance counselors, and many others across the country are asking important questions of the new venture:

- What are the characteristics of students attending the College?
- What sorts of activities do students engage in during their learning careers at the College?
- What are the activities of faculty and administrators in the College, and how do they differ from those of people at more traditional institutions?
- What are the outcomes for students and others who participate in the program and processes of the College?
- What can be said about student and faculty attrition from the College?
- What are the costs associated with this enterprise and with its major elements: assessment of prior learning, contracts, organized programs?

The challenge in dealing with these and other similar research matters is that the "correctness" of the answers depends upon the perspective of the questioner. For example, in reporting on the mentor-student relationship, mentors will want us to emphasize the teaching that goes on, SUNY administrators will want us to concentrate on the mentors' role in identifying external learning resources, legislators will want primarily to see evidence of what ESC activities cost, while students tend to cite the counseling aspects of this relationship. Multiple frameworks are therefore a critical part of ESC's research and evaluation activities.

A third reason for institutional research relates to the second: the answers to the questions could have enormous implications for higher education. Several states, at least two provinces of Canada, and some OECD member countries have shown interest in nontraditional higher education ventures. If a large number of ESC students are notably different from those at "normal" institutions, we could see many Empire States in the next few years. If the educational activities of ESC students and faculty prove effective, we might see their adoption in some form at existing colleges and universities. This will almost certainly happen if the cost of these alternative modes of learning is less than traditional modes. An institutional research program systematically reporting results can facilitate or, if appropriate, red-flag such happenings in other places.

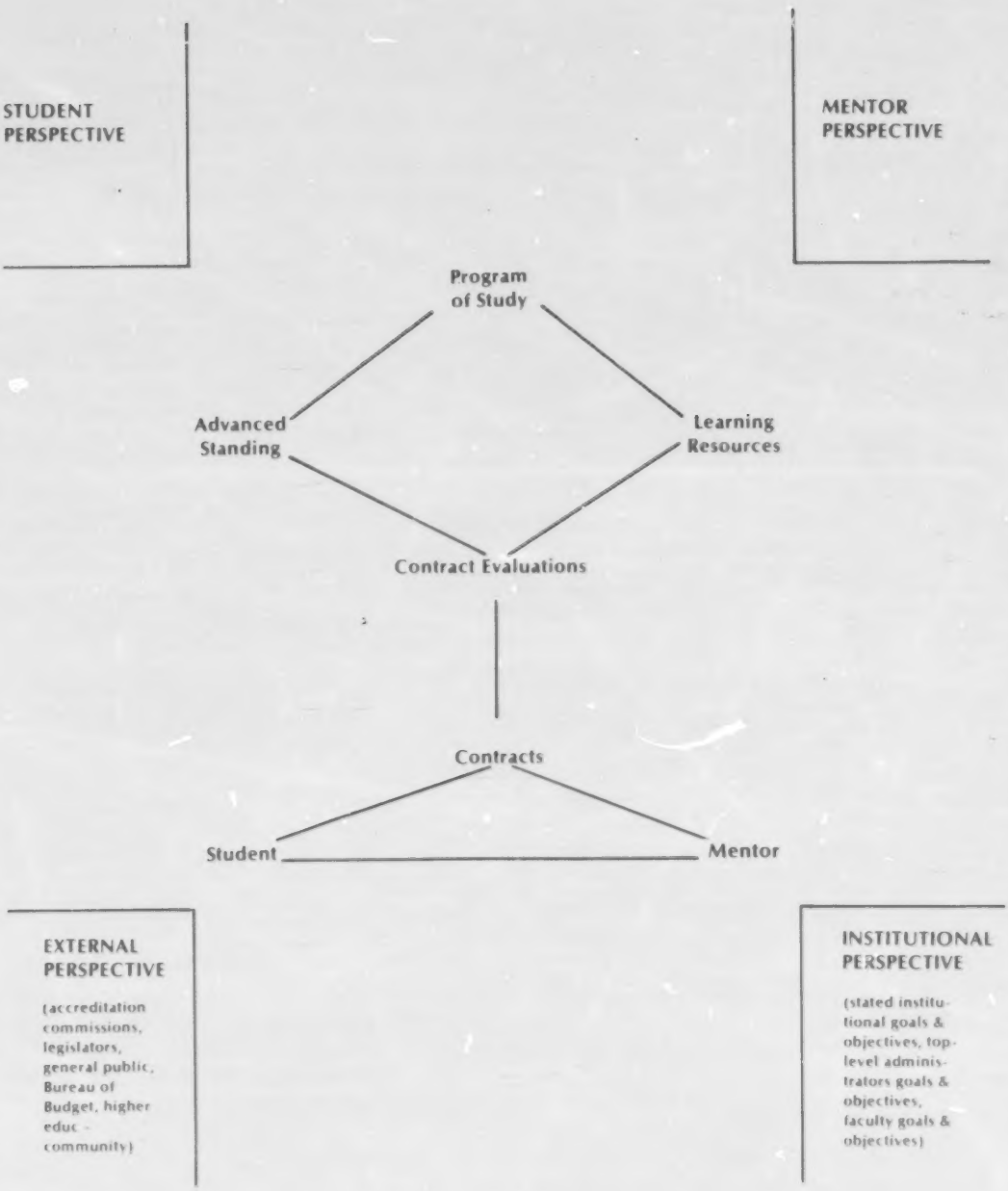
Initial Research Strategy at Empire State College

The nontraditional nature of Empire State College calls for a nontraditional research and evaluation program. Needed is a flexible research strategy which utilizes proven methodologies of institutional research in combination with appropriate new ideas. Our immediate approach began with four major activities that have immediate administrative usefulness and that begin to answer to major questions facing the institution.

1. Design and Develop Computerized Information Files on Students, Personnel, Finances, and Learning Resources

The geographic dispersion of the College necessitates the early placement of visual display computer terminals in the various regional centers to allow remote input and output. The network will be useful for maintaining up-to-date records on students and for keeping the College from becoming buried in paper. The learning resources file will be especially useful for providing rapid dissemination of knowledge about

Table 1
PERSPECTIVES OF EMPIRE STATE COLLEGE



available learning resources. For example, the student interested in studying the welfare system will be able to receive instantaneous information about references and libraries where they are available, internship possibilities, lists of knowledgeable people in the community, etc.

2. Launch Case Studies of "Finishers" — Persons Recently Graduated from the College

This project, which involved intensive interviews with ten of the first 30 graduates of ESC and their mentors, was recently completed.[6] From it, the College learned of some areas that need attention and the research and evaluation staff learned where to focus some future research efforts.

3. Undertake a Cost/Effectiveness Study

This three-year project, recently funded, is the framework into which all other studies will now fall. We currently intend to utilize standardized cognitive and personality instruments in conjunction with content analysis of student learning contract products (e.g. papers), journals and interviews in an unusual rolling longitudinal design (see Table 2).

The year-round calendar of the College which allows students to enter throughout the year necessitates this design which has several starting points and several ending points. Some advantages of a rolling longitudinal study include: (1) it is more representative of continuing patterns than a normal longitudinal design because data is collected over several months at each administration; (2) it is more reliable than a normal longitudinal study because the retestings can serve as a control; (3) like any longitudinal study, it allows the researcher to follow changes in individuals; (4) the interview component increases the likelihood of picking up affective environmental factors; (5) the design allows the researchers to have a large sample without burying themselves at any given time; (6) the test-retest aspect allows early feedback to the College; (7) the longitudinal sample can be used for other studies.

4. Conduct Participant Research at the Regional Learning Centers

The focus of this project was the faculty mentor: What are the mentors' characteristics, activities, problems, anxieties, and ambitions? To find out, we joined the regional center staffs for a period of time and essentially became mentors. The study also involved questionnaires and interviews. An additional major hope was that through the unusual participant methodology, the research and evaluation staff would develop a regional center perspective to go along with the inherent Coordinating Center perspective.

Summary

Institutional research has seldom been an imperative in higher education. However, at Empire State College, a desire for immediate decision-making information, the

Table 2
ROLLING LONGITUDINAL DESIGN

	Month								
Sample	1	2	3 . .	18	19	20 . . .	30	31	32
A	Initial Tests and Interviews			First Retests and Interviews			Second Retests and Interviews		
B		Initial Tests and Interviews			First Retests and Interviews			Second Retests and Interviews	
C			Initial Tests and Interviews			First Retests and Interviews			Second Retests and Interviews

amount and breadth of interest expressed in the institution, and the tremendous potential implications of findings make institutional research an integral part of the developing College. The initial research strategy is to launch studies with immediate utility but which also begin to answer the major questions facing Empire State College.

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[1] Empire State College of State University of New York, *Draft Master Plan 1972*, Saratoga Spring, New York, January 1, 1973, p. 1.

[2] Tom Burns and G.M. Salker, *The Management of Innovation*, Tavistock Publications, Ltd., London, 1961.

[3] Paul Lawrence and Jay Lorsch, *Organization and Environment: Managing Differentiation and Integration*, Harvard Press, Cambridge, Mass., 1967.

[4] Marvin W. Peterson, "Institutional Research and Policy Formulation: A Contingency Model," in Clifford B. Stewart (ed.) *Institutional Research and Institutional Policy Formulation: 11th Annual Forum of the Association of Institutional Research*, 1971, pp. 27-32.

[5] Herbert C. Kelman, "Compliance, Identification, and Internalization: Three Processes of Attitude Change," in Proshansky & Seidenberg (eds.) *Basic Studies in Social Psychology*, Holt, Rinehart, & Winston, New York, 1965, pp. 140-148.

[6] Warren G. Bennis, *Changing Organizations*, McGraw-Hill, Inc., New York, 1966, p. 175.

[7] J.R.B. French and B. Raven, "The Bases of Social Power," in D. Cartwright & A. Zander (eds.) *Group Dynamics: Research and Theory*, 2nd edition, Row, Peterson & Co., Evanston, Illinois, 1960, pp. 607-623.

[8] Ernest Palola and A. Paul Bradley, Jr., *10/30: Ten Case Studies Out of the First Thirty Graduates*, Empire State College, Saratoga Springs, New York, 1973.

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INSTITUTIONAL RESEARCH AND THE EXTERNAL ENVIRONMENT: AN APPROACH TO CONTEXTUAL ASSESSMENT

Paul R. Lyons, Frostburg State College

At the first general session of the 1972 Annual Forum of the Association for Institutional Research, Warren Bennis took time to reminisce about his experiences as Academic Vice-President at S.U.N.Y. — Buffalo. As his address drew to a close Dr. Bennis directed a few "pointers" toward present and future college and university leaders. One such pointer he mentioned had to do with knowing one's territory, one's community; that is, knowing how the institution fits the community, how the institution is perceived within the community and how the institution serves and is served by the community in which it is located. Two days later, on Wednesday, Harold Hodgkinson admonished us for being reductionistic, that is, for allowing our vision to become clouded so that we think in terms of components and not wholes. His argument was very similar to the one about the forest vs. the trees. The message contained in these remarks of the two speakers serves as the introduction for this presentation.

It has always been of extreme importance for college and university leaders to have some knowledge of their institution's place in the environment. The words "college community" more often than not refer to the community of scholars, students and supportive staff. The College Community is seen as an entity, one with boundaries of varying degrees of permeability and fluidity. Today, with public disenchantment focused toward higher education, it would appear that institutional leaders have a greater than ever need to assess and take cognizance of community perceptions of and attitudes toward the college or university. The term community must be regarded in the broad sense. For some institutions, community can mean the world; for others it can mean a continent or a nation; for others, and this includes most institutions, community can mean a state, a region, a city or a town. In post-secondary education we need to take a broader view than in the past. We need to know more about how we are perceived and how we are informally evaluated. One need only briefly scan the literature of higher education before it is quickly revealed that colleges and universities have not taken the time nor the effort to comprehensively examine their environments. A few institutions have done extensive work along these lines primarily in the areas of institutional financial impact on the region, space planning, program planning, enrollment forecasting, manpower needs and the like. Only a handful of colleges and universities have systematically sought to comprehensively study and examine the institution as it is perceived in the field, in the communities. You may be aware of the excellent bibliographies developed by the Council of Planning Libraries. This organization has compiled perhaps the best contemporary accounting of work completed in the area of general campus community relations.

We are wont to make a great deal of assumptions regarding how the institution is perceived, should be perceived or might be perceived. In the absence of any systematically sought-out data such assumptions are relegated to the status of good, bad or mediocre guesses. Most of these assumptions are based upon communication with either friends or enemies of the institution in question. This type of friendly/hostile informal evaluation can, at times, have a vast impact on institutional decision-makers, especially those who do not have some form of objective evidence to rely upon. Institutional researchers, by design or inclination, have not begun to scratch the surface of the researchable domain of community attitudes, perceptions and knowledge.

The assessment of community attitudes and perceptions is but one small piece of the ever-changing contextual mosaic of the institutional environment. In a dynamic society such as ours, one marked by social pluralism, the mosaic as a representation of reality can never be completed as the perspective is never fixed over time. The concept of contextual assessment must of necessity, be a flexiable, fluid one. This is how contextual assessment is valued at Frostburg State College, where the Office of Institutional Research has systematically sought to actualize the concept of contextual assessment, that is, the on-going continual assessment of the institution's environment. The contextual or environment assessment approach is essentially a way of identifying the particular elements of an institution's environment and setting about to assess various characteristics of those elements in relation to the institution. The elements of the environment for a given institution might include (besides faculty, students, and support staff) parents, high school students, the immediate community, the military, the state legislature, the alumni,

and so on.

At Frostburg State, a period of approximately 18 months saw the identification of several environmental elements along with attempts toward assessment of each element. These elements were:

Alumni
Entering Freshmen (prior to attending classes)
Faculty
Administrative Staff
Students ("natives")
Community Residents — General Population
Community Residents — Positional Leaders
Transfer Students

Currently underway is a project which will involve all elements of or a sample of the last six groups represented above.

The contextual approach to assessment, like an annual giving campaign or an elaborate, multi-faceted management information system takes time to develop, cultivate, test, and evaluate. At Frostburg State we have a beginning, a frame of reference has been established. Due to staffing and financial constraints the beginning has been slow and sometimes painful. Thanks to instruments such as the C.U.E.S., I.F.I., I.G.I., the task has been made manageable. Perhaps the most significant virtue of the contextual approach is that the assessments of various element characteristics can be incorporated into the "whole" to give a more comprehensive picture to the viewer. This can be especially valuable if the basic elements of the environment (students, faculty, staff) are continually being assessed with regard to program and institutional governance, aspirations, satisfaction, future orientation and the like. What we are, where are we going can be brought into much sharper focus if one can take into account those elements of the environment which impact upon the institution. Contextual assessment, then, assists with both evaluation and planning. This approach is in direct contradiction of the *modus operandi* of the reductionist.

The Frostburg State College Survey

Assessment of community knowledge of the college and assessment of perceptions and attitudes held concerning the college were the major areas of inquiry with which the survey dealt. It must be pointed out that the survey was regarded as a pilot project, one that was to be refined, polished and periodically replicated. Early in the project the decision was made to include different survey populations. First, a random sample of community residents (general population) was to be contacted. Second, an attempt was to be made to contact positional leaders (mayors, councilmen, county commissioners, business and voluntary association leaders, and the like). As one goal of the project was to supply information for decision-making, it was felt that data provided by such an "elite" sample would be at least as valuable as that provided by the general population. In no instance was the sample of "elites" assumed to be representative of a regional or community power structure although it is conceivable that members of this sample may have been members of the community power structure. Due to the fact that this pilot project started "from scratch," survey instrument development was the most costly aspect of the project with regard to time invested. The survey instrument or interview guide was a document of 25 items (some being fixed-choice response types, others open-ended) was titled the Survey of Community Attitudes and Perceptions (SCAP). The input was provided by the college president and his administrative council (academic affairs, student affairs, business affaris) and the public relations director. The individuals concerned arrived at a set of questions which they believed addressed themselves to the major areas of shared and individual inquiry. The SCAP was revised three times via the consensual approach before reaching its final form. In order to have some basis for comparison among institutional and extra-institutional samples, 8 items (questions) taken from the "Meeting Local Needs" scale of the Institutional Functioning Inventory (IFI) were included in the 25 items. The IFI, as developed by the Educational Testing Service, Princeton, New Jersey, provides a means by which a college or university can describe itself in terms of a number of characteristics judged to be of importance in American higher education. Consisting of 132 multiple-choice items, the IFI yields scores on 11 dimensions or scales, each comprised of 12 items. One such scale, "Meeting Local Needs," is comprised of primarily informational items. Since nearly all faculty and administrative staff had recently been subjected to the IFI, it was decided that the survey populations be subjected to some if not all of the items comprising this scale. Their responses would allow for comparison between the survey population and a supposedly highly knowledgeable population (faculty and staff) with regard to the college. Eight of the 11 items contained sufficient generality to be included in the survey instrument (SCAP).

Clear criteria for defining the "community" in which the College exists were hard to come by, and any of several methods suggested by sociological community study guides and texts could have been used, but each was arbitrary and each would have led to different boundaries. Limits were chosen that were no less arbitrary (yet, hopefully, no less valuable) than those suggested in the literature: it was assumed that college/community attitudes and perceptions would diminish in intensity and accuracy, respectively, with socio-geographic distance from the institution, and chosen as a measure of that distance was the pattern of residence of College employees. It was assumed that employee commuting distance was a fair measure of the College's area of immediate influence. Due to local

geography, radio station signals and local newspaper delivery have about the same degree of dispersion in terms of area. An inventory of the College Directory was made to determine the distribution of employees' residences in the area. Employees' residences were distributed across 15 towns and communities. An unstratified random sample of residents drawn proportionately (based on employee distribution) from these 15 areas was identified (from telephone and utility company listings). The size of the sample was based entirely upon convenience and manageability. Of 62,000 inhabitants in the areas selected represented by 13,426 households, the total sample population of 234 represents approximately 2% of these households. Sample size had to be kept small since person-to-person interviews were to be the means by which the data was gathered with the SCAP instrument. That is, the general population subsample (N=199) was interviewed while the "elites" (N=35, a 70% return)received the instrument through the mail. Trained, although not greatly experienced, interviewers conducted the interviews of the general population over a three-week period. Press releases were issued to legitimize the survey and interviewers carried identification which clarified the purpose of the personal contact.

Independent variables

Four independent variables were selected for close examination. While each variable was not examined across all SCAP items, each variable was examined on several items. All individuals surveyed were asked a series of opening general questions which would enable the researcher to "type" the respondent in the different dimensions or variables. These variables were:

A. Local - Cosmopolitan Orientation
B. Proximity to Campus (Frostburg residents only — "typed" according to address) Persons in the sub-sample from Frostburg (where the College is located) were subdivided into four categories based upon how close they lived to the campus and to areas of student living or walking on a regular basis to the campus. The four "residential area zones" were designated as having (1) "immediate proximity to campus," (2) "moderate closeness to campus," (3) "moderate distance from campus," and (4) "distant from campus." Some differences were expected to emerge among the attitudes and perceptions of the sub-samples in each residential area.
C. Population (General population/"Elites")
D. Length of Residence in Area (Long/Short term)

Those independent variables that were examined with regard to a given item were examined through the use of the Chi Square (X^2) technique.

SCAP Interview Instrument

The content of the SCAP instrument areas of inquiry can be outlined as follows:

A. General Information (concerning the respondent) These items served to establish the respondent's "typing" for the independent variables.
   1. Length of Residence in Community
   2. Local — Cosmopolitan Orientation
   3. Level of Education
B. Information Sources and Opinion
   1. Sources of Information Concerning the College
   2. Typology of Information Sources
   3. Nature of Information
   4. Perceived Opinions about the College
C. Assessment of Factual Knowledge Regarding the College
   1. Major Differences between the College and Neighboring Community College
   2. Student Population
      a. Size of student body
      b. Permanent residence of students
   3. Curricular Offerings
      a. Programs offered
      b. Future program offerings
   4. Faculty and Staff
D. Assessment of Attitudes and Perceptions Regarding the College and its Future
   1. Economic Impact on Frostburg
   2. Economic Impact on Area
   3. Recent Growth Rate ("growth" undefined)
   4. Future Rate of Growth
E. Attendance at College Events
   1. Attendance Patterns in General
   2. Attendance Patterns at the College
   3. Distribution of Attendance across Types of College Events
F. Student/Community Relations
   1. Frequence of Contact with Students
   2. Keyword-Descriptions of "Typical" Student
   3. Major problem areas
G. "Meeting Local Needs" Scale of the Institutional Functioning Inventory

Responses to these eight items were most revealing in that the item content reflected knowledge of College services, practices, policy and philosophy and comparisons could be made across samples of the general population (total sample), "elites," faculty, administrative staff, and Frostburg residents. Wide discrepancies between response patterns of community residents and college personnel were particularly revealing.

In general, the results indicated that the General Population is not aware of the nature of services the College is providing or is able to provide. Lack of knowledge characterized the General Population sub-sample. The Elite sub-sample gave a much higher proportion of "committed" responses (Yes-No) to questions but were highly, almost overly, positive. Faculty and staff, who have more knowledge regarding College

functions and services, had similar response patterns although staff members were consistently more positive with regard to community access to services and functions.

Summary of Tests of Hypotheses (A-F)

Briefly stated, it was a concern of the researchers to determine which of the independent variables treated in the foregoing sections had value in terms of identifying specific college "publics" each having specific or particular response patterns with reference to dependent variables.

Table 1, below, presents the distribution of tests of statistical association over independent variables dichotomized into significant and non-significant outcomes.

Results indicate that one-sixth (1/6) or about 17% of all tests were significant at the .05 level. Proximity and General Population-Elite variables had a much lower demonstration of statistical association with dependent variables than did Cosmopolitan-Local, Length of Residence variables.

From the point of view of decision-making with an eye to the future and to various college publics, this finding presents a problem: it is far easier to identify persons according to Proximity and/or inclusion in the General Population or Elite (positional leaders) samples, but these groupings, unfortunately, do not demonstrate statistical linkages with independent variables. On the other hand, Cosmopolitan-Local orientation and Length of Residence variables represented by population elements are much more difficult to identify yet a higher degree of statistical association is eveident with regard to particular dependent variables.

Table 1
DISTRIBUTION OF OUTCOME — TESTS OF SIGNIFICANCE —

Independent Variables	Outcomes			
	Non-Significant		Significant	
	N	% of Tests	N	% of Tests
Cosmopolitan-Local	7	70	3	30
Proximity	7	100		-
Gen. Pop.—Elite	13	93	1	7
Length of Residence	3	60	2	40
Total Tests	30		6	
% of all Tests		83%		17%

Because the results in terms of total number of tests of significance are somewhat dependent upon the particular matching of independent-dependent variables for testing, it seems reasonable to conclude that no real patterns of association are discernible from the present data. Subsequent follow-up studies will, hopefully, develop more sophisticated means of identifying specific "publics."

Survey Results and Their Application

While reporting specific findings is perhaps inappropriate for this presentation, some indication of how the survey results were applied at the College may be meaningful for researchers. What follows represents some of the effects the survey has had on the "College community."

1. Enhanced Awareness and Knowledge of Top-Level Decision-Makers

   Although the instrument was not sophisticated, a great deal of information was gathered which, heretofore, was unavailable. Some commonly held stereotypes regarding the community were shattered and the available information made it possible for one to visualize how the "typical" community resident views

the College. In addition, information was available indicating what some of the future directions of the College might be.

2. Public Relations/Information Services Re-Evaluation

Since the results of the survey were made available in May of 1972, the Public Relations staff at the College has initiated a series of activities to more adequately project what the College is and is not and, more importantly, the approach taken in informing the public has been changed dramatically.

3. Survey Report as "Required Reading" in Some Departments

Some administrative and academic unit personnel were asked to closely examine the content of the survey analysis with the expectation that said content would be of value in evaluation and planning types of activities.

4. Long-Range Planning

As the College will continue to assess many environmental elements, the community survey (or a similar type of assessment) will remain as one of the major or basic elements for gathering information. Survey results have been useful in the long-range planning effort of the public relations / information services staff, the results are being scrutinized by an *ad hoc* committee which is setting goals (long-range) for the College's graduate program, and they have served as reference material for the College's academic planning group (undergraduate program).

A study currently underway at the College is making use of the Institutional Goals Inventory (I.G.I.) developed by the Educational Testing Service. Different college constituencies (and external groups) are queried by the I.G.I. instrument to seek to establish the importance of both process and output goals. A community sample has been selected for inclusion in this study with the anticipation that not only will community residents' responses be valuable for the current purposes of the investigation but that their responses may serve to test the reliability of the previous community survey.

6. Follow-up

There were enough "surprises" contained in the results of the survey to warrant further and different types of inquiry. In addition, these same results have helped to create a more open, inquisitive attitude on the part of College officials with respect to what is "out there."

In brief summary it can be said that the O.I.R. at Frostburg has sought to "know the territory" as Warren Bennis had suggested. It is believed that any college or university that makes an attempt to develop information about their community or sphere of influence will be light-years ahead of those who are content to play guessing games and who are confident that they "know" what people think. Without systematic assessment and inquiry it is easy to "feel" but not to know.

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PLANNING MODELS IN HIGHER EDUCATION: A COMPARISON OF CAMPUS AND RRPM[1]

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Over the past decade, higher education has experienced a painful transition, from a growth period in which post-secondary education enrollments more than doubled in size, a wave of traumatic student unrest and rebellion, and, now, a phase of consolidation and retrenchment — a period of sober re-evaluation of the purposes and content of higher education.

The difficulties of the past decade have given rise to a massive urge to apply the contemporary technologies of management science, operations research, modeling, and systematic decision theory to the planning and management processes of colleges and universities. The attempt to apply rational economic models to the complex political systems of governmental and social institutions has fallen far short of demonstrable success in relation to our hopes and expectations. Nevertheless, the search persists for more effective ways of utilizing the resources of higher education.

Large-scale computer models are one manifestation of the "managerial revolution" in higher education. In a 1970 survey by Weathersby and Weinstein, 31 higher education models were identified and compared.[2] Among these, eight were comprehensive institutional models but only two were then operational — CAMPUS and the University of California Cost Simulation Model (CSM).[3] Since then several other model systems have become operational. These are: RRPM, CAMPUS/HEALTH (a special version of CAMPUS for medical schools), and the TULANE model. A set of related modeling systems are CAPSC/SEARCH and HELP/PLANTRAN. The former is designed primarily for small liberal arts colleges, while the latter is mainly a budget simulator. There are a number of models being developed for a particular institution, such as RCN and FACSIM, specialized models for the Air Force Academy.

However, for the many institutions of higher education that cannot develop models of their own and are seeking a generalized and comprehensive model, there are two that have attracted greatest attention: RRPM, the most accessible and commonly used; and CAMPUS, the most detailed and comprehensive. These two models are the subject of this paper.

After a brief historical review of the models, discussion will cover the basic structure of the models; common elements and differences between them; their implementation and use; and finally, some comments on some desirable features for their further development.

HISTORICAL DEVELOPMENT

CAMPUS is an acronym for "Comprehensive Analytical Methods of Planning in University Sustems." It has its origin in the work on simulation in higher education done by Judy and Levine.[5] They developed and now market CAMPUS through the firm, the Systems Research Group (SRG) based in Toronto. Judy and Levine developed CAMPUS V[6] under a grant of $750,000 from the Ford Foundation, which was placed in the public domain in 1970.

CAMPUS V was hardly used. It was inadequately documented and very costly — both development and operational costs. The development costs were high because of the large mass of data required by the model, including resource data on each activity — a set or subset of a course that requires a unique set of types of resources. These were used for computations done mostly in one integrated main program that led to high operating costs, especially when answering "What if" questions in the simulation mode. Also, most of the data had to be kept in resident core requiring a very large computer. For the University of Illinois, this was estimated at 4 million bytes, recently reduced to 300,000 bytes as a result of much reprogramming. Thus CAMPUS V was beyond the reach of almost all institutions except the large and the daring. Tnese included the State University of New York at Stony Brook and the University of Illinois. The State of Minnesota also implemented CAMPUS V on a pilot basis (in one school of a univeristy, one state college and one junior college).[7] Despite its limited use, CAMPUS V did perform an important service to higher education. It demonstrated the feasibility of a comprehensive cost simulation model that could improve decision-making in planning and budgeting. What was needed, however, was a model that made more modest demands on data, equipment, and analytical effort so that it could be within the reach of most institutions of higher education.

To achieve such an objective, the U.S. Office of Education funded a proposal for model development by the National Center of Higher Education Management Systems

(NCHEMS) at the Western Interstate Commission for Higher Education. This product is known as RRPM-1 — Resource Requirements Prediction Model.

RRPM 1.2 was the first operational version. It was a modification of the California CSM[8] made by the staff of NCHEMS and a national task force. It was implemented by eight pilot institutions selected to represent the different types and sizes of institutions in the country. As a result of the pilot testing,further modifications were made and RRPM 1.3 was released in mid-1971[9].

Since RRPM 1.3 was a generalized model, other specialized versions were planned. Versions 4[10] and 5 were to be specialized for the community colleges and the state colleges respectively. But instead a sixth version, RRPM 1.6 was released. This involved reprogramming and rearranging of input data by discipline rather than function. This decreased core requirements (along with the fact that it stores only non-zero data) in spite of the relaxation of constraints on the dimensions of student programs and disciplines. This made its use independent of the type of institution using it. It is also conceptually simpler than RRPM 1.3 because it has no space-management module and has fewer relationships for support costs. It was implemented in 1972[11] and has now been released to the public. Both versions 1.3 and 1.6 are now operational, but only 1.6 is being maintained by NCHEMS.

Meanwhile CAMPUS underwent considerable changes. It was completely reprogrammed as CAMPUS VI and was made modular. This greatly reduced its operational costs and core requirements. But data are still required at the activity level. However, the input formats were changed and documentation was greatly improved making data preparation much easier. CAMPUS VI was reprogrammed as CAMPUS/COLORADO and [12] CAMPUS VII, making them more modular, more flexible in their dimensions, with additions in the costing routines, and a better handling of the research sector.

In addition, CAMPUS VII was developed.[13] This version does not require data at the activity level and hence has further reduced core requirements and operational costs. It is designed for institutions requiring data only at the aggrevated level of department or above.

In summary, there are two operational versions of each family of models worth examining: Versions 1.3 and 1.6 for RRPM; and Versions VII and VIII for CAMPUS. But RRPM 1.3 and CAMPUS VIII are conceptually the more comprehensive of their family of models and as such will be the basis of most of the discussion that will follow. Differences in the other operational models, when significant, will be so identified.

Basic Logic

The basic logic common to both RRPM 1.3 and CAMPUS VIII is shown in Figure 1.[14] There are many minor differences that do not appear in Figure 1 and have been deleted in order to keep the figure simple. An example is the computation of instructional load. In RRPM, this is calculated in credit hours and is then converted to contact hours by a ratio of contact hours to credit hours. This conversion is not required in CAMPUS which has all its activity loadings expressed in contact hours. It is also unnecessary in RRPM if the student loading is done in contact hours to start with. There are many other such minor differences that will not be discussed. There are, however, two main differences in the logic of RRPM and CAMPUS. They concern the level of detail in instructional loading as well as in planning factors. These will be discussed in turn.

The instructional loading in RRPM is done through an induced course load matrix (ICLM). In this matrix, each column represents the credit hour load induced by a student major (at different levels of academic achievement) on different levels of courses that are offered by different disciplines. In CAMPUS, the load induced is not in terms of aggregated levels of courses (as in RRPM), but in terms of specific courses or activities. Examples of activities would be a course with two weekly contact hours of lecture and one weekly contact hour of lab (or recitation). Since they require different types of resources (personnel and space), the lecture and lab are separate activities. The detailed level of activity does generate a variety of reports that can be very valuable, especially in costing which will be discussed later. It also enables planning at the most elemental academic organizational level and involves all organizational levels in the planning process. However, there is a price that must be paid: the massive detailed data input required at the activity level.

In the case of the University of Colorado, there are over 2,000 activities and for each activity up to 16 data elements on resource loading have to be specified. These data must be collected (typically on forms) converted to machine-readable form, stored, processed, and maintained. The maintenance cost (especially on the mix of activities required for each student program) could be high for institutions where student preferences change or where course requirements change significantly. It is difficult to predict in cases of new student programs and degrees. It is even difficult to specify the activity mix in order to maintain status quo. This is due to the fact that the student load and activity mix varies not only between semesters but also among types of programs such as daytime and evening programs. The mix can be unstable even at the aggregated level of the ICLM, as was experienced by the pilot institutions of RRPM 1.3[15] and other ICLM studies.[16] These studies show that the greater the disaggregation of the ICLM, the more the instability. This instability will increase as students demand and get more electives and unstructured degree requirements. This will increase the problems of predicting new course mixes and the redistribution of old

Table 1
SOME PLANNING FACTORS IN RRPM AND CAMPUS

	CAMPUS VIII	RRPM 1.3
INSTRUCTIONAL		
• Student programs	• by detailed course activity mix	• by mix of credit hours in department/discipline

	• resource loading of each activity
	  • space
	  • personnel type
	  • time of offering
		• loading of groups of courses at different levels and fields
		  • space
		  • equipment

	• section size
	  • average
	  • maximum
	  • minimum
		• section size
		  • average

	• maximum number of sections	
• Faculty	• substitution policy • contract length • turnover rates and hiring policy • sabbatical policy • weekly availability • promotion policy	
	• average salaries by rank	• average salaries by rank
	• rank distribution	• rank distribution
	• academic level	• academic level
	• workload weights • administrative load	
SPACE		
	• substitution policies	(not in RRPM 1.6)
	• availability	• availability
	• utilization • type	• type
	• size	• size
	• construction coefficients	• construction coefficients

ones that are dropped.

The detailed level of data required by CAMPUS occurs throughout the model and is reflected in the planning variables. As an example, consider the determination of the number of sections required. In both the RRPM and CAMPUS, the number of sections is determined by dividing the student load by the average section size and using some rule for accounting for the leftovers. In CAMPUS, however, the solution is subject to many constraints such as maximum class size, minimum class size, and maximum number of sections. This adds to the control and flexibility that the user has, but it requires that all these constraints be specified as planning variables (one set for each activity).

For some institutions this choice of planning variables is often unnecessary, and this has been recognized in RRPM 1.6 where the faculty FTE can be calculated by an option that uses a weekly credit-hour (or contact-hour) load by level of course, thereby eliminating the planning factors of average section size, credit to contact-hour ratio, distribution of contact hours, distribution of faculty rank, and average faculty work load by rank.

There are other planning factor differences between RRPM and CAMPUS. These are listed in Table 1. One set found in CAMPUS alone enables the "flowing" of faculty between time periods, using rates of turn-over, sabbatical, and promotion policies, contract lengths, and availability periods. CAMPUS maintains a faculty inventory for each time period. It also allows for substitutions among ranks within a cost center but not any substitution among discipline specialities within ranks.

There are three parts of the CAMPUS VIII model other than those shown in Figure 1. One part is a Student Flow module that goes in front; one part calculates non-teaching-salary costs; and a third part is a costing module. Each will now be discussed.

The Student Flow Module

This module determines the student enrollment in each student program at each level of student academic achievement (freshman, sophomore, etc.). It is part of the CAMPUS VIII package and determines the flow of students through the system by using pass-fail rates at each level, repeat rates at the same level, drop-out rates at all levels, and transfer rates between programs. This is conceptually similar to the Student Flow Model developed by NCHEMS that is designed to interface with RRPM.[17] Following the NCHEMS tradition this model was developed by its staff supported by a national task force, tested at selected pilot institutions and implemented successfully.[18]

The NCHEMS student flow model and the one in CAMPUS VIII have much in common: both can be bypassed if desired; both use data on freshmen enrollment and transfers as exogenous variables; and finally, both have problems and issues raised by using the transition matrix. Some of these issues include: the definition of points and student states most suitable for the transition matrix; the calculation, aggregation and stability of transitional probabilities; and the validity of the Markovian assumption for student transitions. These issues are part of the ongoing research and development work being done at NCHEMS.

Non-Salary Costs

Non-salary costs are calculated in both RRPM 1.3 and CAMPUS VIII at the cost center level. This requires the estimation of both the relationship and the cost coefficients at the cost center level. This is no trivial task. In the University of Colorado, implementation of CAMPUS requires stating 2,800 equations and estimating cost coefficients. Over 43 variables are used in these relationships, most of them being endogenously determined. (CAMPUS VIII allows up to 130 such variables, and 13,000 equations.)

Costing

Both CAMPUS and RRPM calculate costs for academic and support program and subprogram levels of the NCHEMS Program Classification Structure. In addition, in CAMPUS VIII, the costs are aggregated by budget function and object category. This facilitates preparing annual line-item budgets for financial control needed in addition to program budgets for analysis and decision making.

Both CAMPUS and RRPM calculate unit costs for student programs by contact hour, credit hour and FTE for different levels of aggregation. In addition, CAMPUS calculates the direct cost for each activity. This is aggregated for each activity in the activity mix of each student program and gives annual student program costs. In RRPM, the student program cost is determined as the inner-product of average cost per student credit hour by discipline transposed back through the ICLM to student program. The average cost figure, however, may result in student programs using less than average cost courses in the discipline being overpriced and programs using higher than average costs being underpriced. This possibility does not occur in CAMPUS because of its detailed activity level costing data.

Indirect costs are allocated to primary programs (Instruction, Research and Public Service) in both CAMPUS and RRPM 1.3 but not in RRPM 1.6 because this is to be done in the Cost Finding Principles Program of NCHEMS.[19] It has software that will allocate support costs to primary programs and can be used as a costing module independently or in conjunction with RRPM.[20] The project software could also be used in a simulation mode to experiment with parameters of allocations. Once the parameters are selected they can then be used for allocation in RRPM 1.3 or 1.6. In CAMPUS, there are plans for options as to some allocation rules: by a specified percentage; in proportion to the direct cost of the receiving categories; or a combination of those two rules.

The Cost-Finding Principles project is also expected to suggest procedures for cost exchange among institutions, another of NCHEMS projects.[21]

Cost allocation raises numerous problems including one of allocating faculty effort between instruction, administration, research, and public service. Should this allocation be done by assignment or by actual effort distribution? If the latter, how is faculty effort to be measured? This problem has been a concern of institutional researchers for over a decade and has not resulted in much agreement. For example, in measuring faculty effort, 24 studies measured hours spent weekly, while 16 used percentage distribution of time, and four studies used both. [42] This problem and related ones, are the subject of yet another NCHEMS project: The Faculty Activity Analysis.[43]

Differences between RRPM and CAMPUS

Many differences between RRPM and CAMPUS have been identified above. Other differences are in the dimensions of the model. These are shown in Table 2. Some differences of a technical nature are listed in Table 3. Other main differences concern the revenue module, capital budget, output reports, and implementation considerations. These are discussed below:

Table 2
A COMPARISON OF DIMENSIONS*

	CAMPUS		RRPM	
	VII	VIII	1.3	1.6
Student Programs	20	350	90	200
Academic Disciplines or Departments (Teaching Cost Centers)	30	100	90	200
Nonacademic Departments (Nonteaching Cost Centers)	10	25	—	—
Activities	0	4000	0	0
Course Levels	1	(implicit in activity specification)	4	7
Instruction Type	3	9	4	5
Student Levels	4	8	7	7
Faculty Ranks	5	10	5	6
Nonacademic Ranks or Classifications	7	150	4	4
Space Type and Size Ranges				
• academic	8	125	2	0
• nonacademic	10	110	4	0
Nonpersonel Resource Types	7	120	3	7

*Source of data:
A.P. Van Wijk and R.S. Russell, "State of the Art in Educational Cost Modelling," Paper presented at the ORSA, TIMS, and AIIE Joint Meeting in Atlantic City, November 1972, Toronto, Canada: SRC., 1972, p. 35; K.M. Hussain, op. cit. p. 18, and D.G. Clark, et al., Introduction to the Resource Requirements Prediction Model 1.6, Boulder, Colorado, NCHEMS at WICHE, 1972, p. 6.

Revenue Module

RRPM has no revenue module, while both CAMPUS VII and CAMPUS VIII do. In CAMPUS, revenue from students is estimated as a function of projected enrollment and tuition rates. Revenue from public funding agencies is calculated by formula which in many cases must be restated and reprogrammed in order to meet local needs. The revenue components can be projected from year to year either by an absolute value or by a given percentage change. The model does not include important components such as financial aid and portfolio management.[24] What it does include is grants, gifts, endowments, and special revenues which are treated exogenously instead of making them a function of endogenous variables such as student enrollment number, type of student programs, etc.

Capital Budget

Both RRPM 1.3 and CAMPUS VIII calculate the incremental cost of capital expenditures resulting from projected increase in space requirements. To calculate this, however, CAMPUS VIII has a greater facilities-planning capability. It "shuffles" rooms around according to given space substitution and utilization policies; calculates net shortages and surpluses of space by type; calculates space utilization and maintains inventories of rooms by size and types.

CAMPUS VII calculates the square feet of space and number of stations required for its eighteen space types. RRPM 1.6 has no space management or capital budgeting capability.

Output Reports

All operational versions have sets of output that vary in number and content, but CAMPUS VIII has by far the most detailed and comprehensive set. Its input data, being collected at the lowest activity and organizational level, enables it to aggregate its output at all organizational levels. The output is particularly good for space management and on administrative indices on loading, costing, and utilization.

RRPM 1.3 has a unique report. It identifies on one page the results of ten sets of changes made in the "what if" experimentation mode.[25] The display of results facilitates an analysis of incremental changes and sensitivity analysis. For such experimentation the user may make blanket changes by percentage or an absolute value in addition to replacing one or more values. CAMPUS and RRPM 1.6 allow only a percentage blanket change and only for a select set of variables.

RRPM 1.3 also has a TRACER - TRAINER routine that "traces" all the intermediate output for any one selected discipline.[26] This is useful not only in training a user on how the model handles his data but also in debugging and in validating the model.

An institutional implementation of RRPM 1.3 has the TRACER on a terminal in the programmed instructional mode along with routines to help the uninitiated user. CAMPUS also has a CAI package. It has an interactive prompter which is especially helpful to the user.

One final set of comments on comparing differences: one must recognize that RRPM has always been considered by its designers as one component of an ongoing process of developing an inter-related system for planning and management in higher education. The NCHEMS Student Flow Model, Cost-Finding Principles, Output Evaluation, Facilities Analysis and other projects interrelate with RRPM as part of the larger planning and management system.

Perhaps the most important NCHEMS project is that on outputs of higher education. This project is concerned with identifying the output[27] and developing instruments for measuring them. Once this is done, then it will be possible to conduct cost-benefit analysis which is so important to evaluating performance. This capability will also eliminate the current danger and concern that unit costing will be misused by funding agencies for allocating resources among institutions. There is the danger, as Gary Andrew points out, that "without definitions and measures of outputs, the cost simulators are likely to lead administrators to take unwarranted actions . . . Cost simulators will most likely get blamed for some of the intermediate bad decisions and not get credit for speeding up on our way to an improved management process by forcing us to 'get off our hands and counter the threat.' "[28]

Cost of Implementation

In evaluating models, one should look at their cost-effectiveness ratios. The effectiveness of a planning model, however, cannot all be quantified. Its implicit value could, however, be compared to costs, and a judgement could then be made as to whether or not the model is worth the cost.

In calculating the costs, one must differentiate between development and operating costs. Development costs include the cost of software discussed in Table 3. Other development costs include costs of changing the model to meet institutional needs, validating the changes, data generation, and training. Typically, the largest component is that of data preparation. This, in turn, depends largely upon the type and quantity of data required. This could be compared for actual implementations of the models, but such comparisons invite suspicion since institutions to be compared are often different in structure and complexity and have different data bases. To overcome this problem one could compare the data generation problem for different types of institutions for each of the models. This is done for four types of institutions whose institutional characteristics are compared in Table 4. Their data generation problems are compared in Table 5.

Data generation is important not only in estimating development costs, but also in estimating operational costs.

Table 3
A COMPARISON OF SOME TECHNICAL DATA

	CAMPUS		RRPM	
	VII	VIII	1.3	1.6
Program Language Used	FORTRAN IV	FORTRAN IV	FORTRAN & COBOL	COBOL (ANSI)
Equipment Used	Most Computers upward of an IBM 1130	IBM CDC	IBM CDC UNIVAC	IBM CDC UNIVAC BORROUGHS
Minimum Core Requirements (thousand bytes)	16	256	128	50 for DOS 65 for OS
Cost of Software				
• purchase	$12,500	$25,000	$50.00	$50.00
• lease	$ 3,000 +350/m for 36m	$ 6,000 +700/m for 36m		
Consulting services for overall project management, training of senior staff and adaption of planning manuals.	Varies $5,000 to $50,000		NCHEMS provides limited training at nominal cost. Other help in implementation is a function of the supply and demand of its staff.	

Source of data:
SRG: "A State of the Art review of Computer - Based Educational Planning Systems," DRAFT Unpublished, Aug., 1972, pp. 48, 50, 51, and A.P. Van Wijk and R.S. Russell. op. cit., pp. 32-35 on CAMPUS; K.M. Hussain, op. cit. on RRPM 1.3, and Clark, et al., op. cit., p. 31, RRPM 1.6

Table 4
CHARACTERISTICS OF INSTITUTIONS COMPARED (FOR 1971-72)

	Multi-Campus University		State College	Community College
	Main Campus	Branch Campus		
Student FTE (Average for Year)	18,632 (Semester)	2,283 (Semester)	5,284 (Quarter)	2,400 (Quarter)
Highest Degree Offered	Ph.D.	Masters	Masters	Associate
Student Programs	275	26	65	58
Cost Centers - Academic	53	12	46	11
Cost Centers - Non-academic	47	9	20	21
Academic Activities	2,200	724	1,200	244
Instruction Types	9	6	4	2
Student Levels	8	6	6	1
Course Levels	5	5	5	1
Faculty Rank	9	5	8	1
Non-Adacemic Rank	38	15	33	5
Space Types	70	29	15	15
Other Resource Categories	19	10	10	3
Other Resources Subcategories	56	31	4	7

Table 5
COMPARISON OF COST-RELATED ELEMENTS

	Multi-campus University								State College				Community College			
	Main Campus				Branch Campus											
	CAMPUS		RRPM		CAMPUS		RRPM		CAMPUS		RRPM		CAMPUS		RRPM	
	VII	VIII	1.3	1.6	VII	VIII	1.3	1.6	VII	VIII	1.3	1.6	VII	VIII	1.3	1.6
Data Elements in ICLM (in 000's)	18	1815	18	18	3	19	3	3	3	78	3	3	6	14	6	6
Regression Equations for non-teaching salary costs		2800	300			630				2400				600		
Development Costs * in 000's of $	12	80	35	9	4	20	25	5	10	26.4	32	7	4	20.7	24	6
Run Cost in $ ** for one complete set of reports	3	500		3	2	200		2	2	300		3	2	200		2
Maintenance ** Cost in Analyst FTE	1.0	3.0	1.5	1.0	0.25	0.5	0.75	0.5	0.75		1.0	0.5	0.75	0.5	0.5	0.25

*These costs do not include the cost of administrators working on the model, cost of software, consulting or overhead. Some of may be sunk cost.

**These costs need not be out of pocket costs, especially if the model becomes part of the 'normal' operations of the institution.

Such costs increase greatly when data elements are updated annually. In a cost study done for CSM (the conceptual basis for RRPM), Hopkins found that annual updating of the data base more than doubles the annual operating costs of maintaining the model.[29] Maintenance of the data base is necessary in order to reflect the changing values of many of the parameters in the model. In a study of some departments in Berkeley, Breneman found that the faculty requirement coefficients vary as much as 200% from one year to the next.[30]

Changes to parameters also result during experimentation when making simulation runs. This increases the operational cost (the cost of each simulation run is shown in Table 5), which is a necessary cost if one wants to investigate the consequences of possible changes.

Other components of operational costs result from the need for continuing analysis of output, and the need for training the user. These components are very important aspects of implementation and are not sufficiently recognized. The estimates for this effort is shown in Table 5.It will vary with institutions and is a function of their planning experience; the support that they can get from other departments such as the Computer Center; the number or nature of modifications to the model initiated by the user and the Computing Center; the extent of the use of the model; and finally the thoroughness with which the task is performed.

In Table 5, the figures for CAMPUS VIII are based on emperical data. The figures on RRPM were calculated from the manual on that model.[31] The figures on the remaining models were estimated by the writers and their colleagues who are knowledgeable about the institution and very knowledgeable about implementation of the models concerned. The figures were then checked against published data on implementation. Unfortunately there are not much data on the implementation of RRPM 1.6 and CAMPUS VII since these are relatively new models and have few implementations. The number of implementation of these and other models are shown in Table 6.

Summary and Conclusions

In comparing the class of operational models of RRPM and CAMPUS, one can identify the models that operate at the discipline or department level as being RRPM 1.3, RRPM 1.6 and CAMPUS VII. Among these, RRPM 1.6 is conceptually the simplest and least comprehensive. It is also the cheapest in both development and operational costs. RRPM 1.3 is slightly less comprehensive than CAMPUS VII but is cheaper to develop largely because of its negligible costs of software. It does, however, require more computer core memory than does CAMPUS VII or RRPM 1.6

CAMPUS VIII is the most comprehensive of all the models examined. It is also the most detailed both in the

Table 6
NUMBER OF IMPLEMENTATION*

CAMPUS VI!	3
CAMPUS V, VI & VII	36
RRPM 1.3	70**
RRPM 1.6	
CEM	110**

* Source of Data: For CAMPUS, the data came from A.P. Van Wijk and R.S. Russell op. cit., p. 34, and for RRPM and CEM the data came from NCHEMS at WICHE.

CEM is a training version of RRPM that after being used for training is also being used for planning in the operational mode. It is conceptually similar to RRPM 1.3, has smaller dimensions than either 1.3 or 1.6, and has been implemented only on IBM equipment.

**These figures are for programs distributed, not necessarily all implemented. NCHEMS does not implement or control the use of its software and hence has no way of knowing exactly how many of its programs have actually been implemented.

input required and the output produced. It is, therefore, more suitable for decision making at the detailed and departmental level (for budget or curriculum planning), but the price of such capability is larger core requirements and higher costs of both development and operations. It also has the longest lapse time for implementation (between 9-12 months as compared to 2-8 months for the others).

Both CAMPUS and RRPM in all their operational versions have some common characteristics: they are cost and resource models, not cost-benefit models; they are simulation models, not optimizing models;[32] they are subsystem models, not total system models; they have mostly linear equations for calculating their non-salary costs and use marginal costs, thereby ignoring economies of scale and discontinuities; both are basically student-driven; neither model predicts the number of new entrants to the institution nor do they relate it to manpower requirements; and finally, both are deterministic models (except for the probability matrix used in the student flow module).

From the viewpoint of helping the user implement and use the model, neither family of models provides help in formulating the support (non-salary) cost equations nor in calculating the cost coefficients. Also, no help is provided in studying and improving the stability of parameters, especially the ICLM. Some work has been done with CAMPUS and RRPM 1.3 in using terminals but not enough work done on the economics and feasibility of using the model to respond to "What if" questions in the on-line-real-time mode. Also, no help is provided to the user in searching through the very large set of permutations of possible alternative strategies. Search routines for identifying "promising" and near optimal strategies will greatly help the user. Routines that will "bound" the feasible region will help also. The current output will help the user if it were packaged with graphics that show "trends" and "gradients" rather than masses of numbers. Reports should be designed that also help in management by exception by identifying infomation and variations that exceed allowable levels. Finally, neither model enables the user to calculate trade-offs directly. For example, if one wishes to find the trade-offs between average section size and faculty load which keep the cost constant, one has to guess at pairs of values, calculate the costs, and then plot an iso-cost curve. This can be both costly in computer time and slow in response time.

Some of the limitations discussed above will undoubtedly be relaxed in future versions of CAMPUS and RRPM (and related models). The RRPM development is

related to projects on Identification and Measurement of Outcome of Higher Education; Faculty Activity Analysis; Program Classification Structure, Data Element Dictionary, Cost Finding Principles, and Information Exchange. For implementing these models, NCHEMS is federally funded and can call upon the advice and help of personnel from any of its participating institutions. All these resources will be required to implement the many ambitious projects that NCHEMS has planned. In doing so, it is hoped that it will not "drive out" organizations in the private sector that develop models such as CAMPUS, HELP/PLANTRAN, and SEARCH. These models provide an important choice to model users; new users, as well as some that have implemented RRPM and want more detailed planning information. To the latter group, CAMPUS VIII is a logical choice provided they can afford the extra cost. As long as CAMPUS continues to remain compatible with basic WICHE products on definitions, classifications, and measures, it will offer an important upward compatible choice for users that have had their planning model experience with RRPM.

Institutions for which neither RRPM nor CAMPUS is adequate — such as institutions with heavy noninstructional emphases — may still find that CAMPUS or RRPM provide a basis for building an institutionally unique model.[13] These models also provide an important training ground for use of planning models. The benefit of these large-scale models for structuring and integrating the institution's basic information system will be discussed in Madelyn Alexander's paper being given at this Forum on implementation of CAMPUS.[14]

Finally, the implementation of these deterministic cost simulation models may be expected to lay the foundation for development of the next generation of planning-budgeting models. Hopefully, this next generation of models will provide heuristic and optimizing capabilities and will incorporate benefit values as well as costs.

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[1] Both authors are involved in implementing CAMPUS/COLORADO (a version of CAMPUS VIII) on campuses in Colorado. Also, both authors were on the Task Force that designed RRPM 1.3. One author was responsible for one pilot implementation of RRPM 1.2.

[2] See F.J. Lyden and E.G. Miller, *Planning, Programming, Budgeting*, Chicago: Markham Publishing Co., 1968; and J. Farmer, *Why Planning, Programming, Budget Systems for Higher Education?*, Boulder, Colorado: WICHE, 1970.

[3] G. Weathersby and M. Weinstein, "A Structural Comparison of Analytical Models for University Planning," Paper, P-12, Berkeley, Calif.: Office of Analytical Studies, University of California, August, 1970. For a similar study, see J.A. Casaco, "Planning Techniques for University Management, A report for the American Council on Education," Spring, 1970. In it, Casco presents 20 models of the 40 reviewed. See also C. Lovell, *Student Flow Models: A Review and Conceptualization*, Boulder, Colorado: NCHEMS at WICHE, 1971.

[4] References for the source documents on this model and others mentioned on this page can be found along with annotated bibliographies in K.M. Hussain, *A Resource Requirements Prediction Model: Guide for the Project Manager*, Boulder, Colorado: NCHEMS at WICHE, 1971, pp. 94-108.

[5] R.W. Judy and J.B. Levine, *A Tool for Educational Administrators*, Toronto: University of Toronto Press, 1965.

[6] For a discussion of the development of CAMPUS I-IV, see R.W. Judy, "Systems Analysis for Efficient Resource Allocation in Higher Education" in J. Minter and B. Lawrence (eds.) *Management Information Systems: Their Development and Use in Higher Education*, Boulder, Colorado: WICHE, 1969, pp. 41-58.

[7] *Project PRIME*, under the direction of Gary M. Andrew, produced a set of 16 reports by different authors. Minnesota Higher Education Coordinating Commission, 1971.

[8] G. Weathersby, "Development and Application of a Cost Simulation Model," unpublished monograph, June 15, 1967. For a critique of CSM see D. Hopkins, *University Cost Simulation Models: A Critique*, Berkeley, University of California, 1969. For a response to the critique, see Gary M. Andrew "Further Thoughts on the Use of Large-Scale Simulation Models for University Planning," Unpublished paper, Boulder, Colorado: March, 1971.

[9] See K.M. Hussain and J. Martin, *A Resource Requirements Prediction Model (RRPM 1): Report on the Pilot Studies*, Boulder, Colorado: NCHEMS at WICHE, 1971.

[10] RRPM 1.4 was implemented at the New Mexico Junior College according to the specifications made by the Ad Hoc Committee on the design of RRPM 1.4.

[11] R. Huff *et al.*, *Implementation of NCHEMS Planning Models and Management Tools at California State University, Fullerton*, Boulder, Colorado: NCHEMS at WICHE, 1972.

[12] CAMPUS/COLORADO is a version of CAMPUS VIII programmed for the CDC 6400. The main differences are that CAMPUS/COLORADO has the PCS structure (developed by NCHEMS at WICHE) and has its own formulae in its Revenue and Costing Modules. Additional capabilities include the ability to calculate the new space required for offices and the ability to maintain non-integer inventories of non-teaching staff. It has also additional dimensions especially in the number of cost centers.

[11] For a U.S. implementation, see William Lombus, "CAMPUS VII Helped a Small College Plan for the Future While it Had One" in *College and University Business*, Vol. 53, No. 5, November 1971, pp. 37-39, 58. In the same issue, are other articles on RRPM (pp. 32-33), SEARCH (p. 43), and CAMPUS (pp. 35-36).

[12] For details on the logic and numerical examples illustrating the logic see K.M. Hussain, *CAMPUS/COLORADO: Logic of the Model — A Self Instructional Approach*, Boulder, Colorado: Office of Institutional Research, University of Colorado, 1972, and K.M. Hussain, 1971, *op cit.*, pp. 9-12, 70-92.

[13] See K.M. Hussain, 1971, *op. cit.*, pp. 27-28.

[14] See F.I. Jewett *et al.*, *The Feasibility of Analytical Models for Academic Planning: A Preliminary Analysis of Seven Quarters of Observation of the "Induced Course Load Matrix,"* Los Angeles, Office of the Chancellor of California State College, 1970, and K.M. Hussain and N.S. Urquardt, *The Induced Course Load Matrix for Planning in a Community College: A Conceptual and Empirical Study*, Hobbs, N.M.: New Mexico Junior College, 1972.

[15] R.S. Johnson, *NCHEMS Student Flow Model SFM-1A: An Introduction*, Boulder, Colorado: NCHEMS at WICHE, 1972.

[16] Huff, *et al.*, *op. cit.*, pp. 41-54.

[17] See G. Ziemer, *et al.*, *Cost Finding Principles and Procedures*, Boulder, Colorado: NCHEMS at WICHE, 1971.

[18] For its implementation in conjunction with RRPM 1.6, see Huff *et al.*, *op. cit.*, pp. 21-36.

[19] For details, see L.C. Romney, *Information Exchange Procedures: Overview and General Approach*, Boulder, Colorado: NCHEMS at WICHE, 1972.

[20] L.C. Romney, *Faculty Activity Analysis: Overview and Major Issues* Technical Report No. 24, Boulder, Colorado: NCHEMS at WICHE, 1972, pp. 81-82.

[21] *Ibid.*

[22] For one research formulation of this, see T.W. Ruefli, *Project Generalized University Model, Phase III*, Final Report, Austin: Graduate School of Business, University of Texas, November, 1969.

[23] For a sample, see W.W. Gulko and K.M. Hussain, *A Resource Requirements Prediction Model (RRPM-1): An Introduction to the Model*, Boulder, Colorado: NCHEMS at WICHE, 1971, p. 33.

[24] See K.M. Hussain, 1971, *op cit.*, pp. 49-52, 65.

[25] For details, see S.S. Micek and R.A. Walhaus, *Outcomes of Higher Education — A Draft*, Boulder, Colorado: NCHEMS at WICHES, August, 1972, and B. Lawrence, *et al.*, (eds.), *The Outputs of Higher Education: Their Identification, Measurement, and Evaluation*, Boulder, Colorado: NCHEMS at WICHE, 1970.

[26] Gary M. Andrew, *op. cit.*, p. 11.

[27] D. Hopkins, "University Cost Simulation Models: A Critique," Berkeley, California: Office of Vice President — Planning and Analysis, University of California, April 1969, p. 9.

[28] D. Breneman, "The Stability of Faculty Input Coefficients in Linear Work Load Models of the University of California," Berkeley, California: Office of the Vice President — Planning and Analysis, University of California, February, 1969. Also reported by Hopkins, *op. cit.*, p. 13.

[29] Gulko and Hussain, *op. cit.*, pp. 16-17.

[30] For one approach using an LP model, see R.A. Walhaus, "A Linear Programming Formulation for Degree Output Planning," — A Discussion Paper, Boulder, Colorado: NCHEMS at WICHE, 1971. See also A.M. Geoffrion *et al.*, *Academic Department Management: An Application of an Interactive Multi-criterion Optimization Approach*, Berkeley, California: Office of the Vice President of Planning October, 1971, Paper, P-25, p.27.

[31] An example is Stanford University, with its major research component, as revealed in its pilot implementation of RRPM 1.2. See K.M. Hussain and J. Martin, *op. cit.*, pp. 75-82.

[32] M. Alexander, "The Implementation of CAMPUS/COLORADO at the University of Colorado," Forum of the Association for Institutional Research, Vancouver, B.C., May, 1973.

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THE IMPLEMENTATION OF CAMPUS/COLORADO

Madelyn D. Alexander, University of Colorado

Implementation of a simulation model means different things to people at different levels and with different roles in an institution. To the data analyst, impleemntation is when the model "runs" and is validated. To the administrator, it is when the outputs of the model can be used in a decision. To a department chairperson, it is when he or she can use it to justify additional money in the department's budget.

Churchman and Schainblatt define the "problem of implementation" as "the problem of determining what activities of the scientist and the manager are most appropriate to bring about an effective relationship between the two."[1] If one substitutes the words "analyst or planner" for scientist and "user" for manager and considers the number of users in a university setting, one has an inkling of the enormous and long term task of trying to make a simulation model a useful tool in a university.

The purpose of this paper is to discuss how the University of Colorado is implementing the CAMPUS / COLORADO model at all levels within the institution. This implementation began as a data problem, and this paper will discuss this area in detail; but it soon grew to include the projects necessary to carry CAMPUS to all its potential users — including the State of Colorado.

About CAMPUS

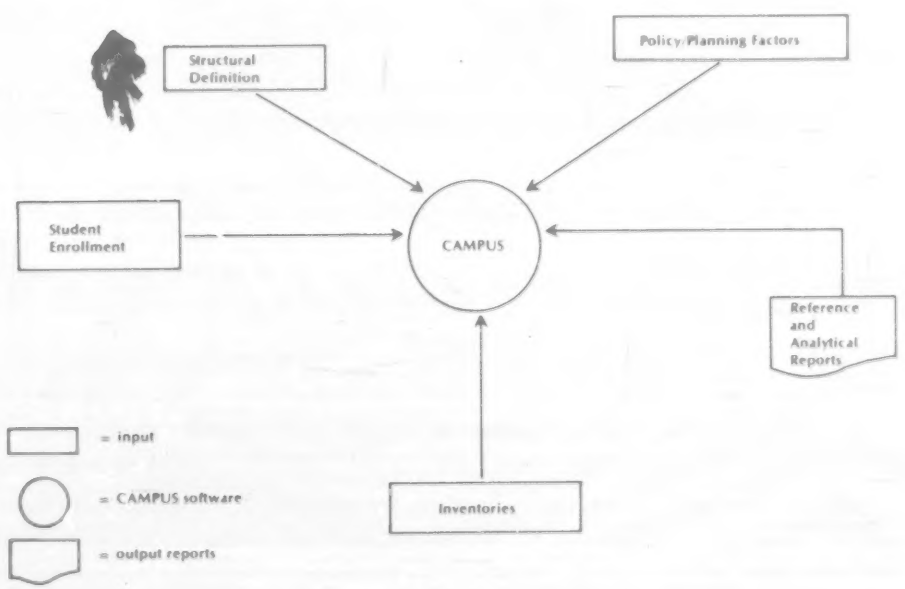
It isn't possible to discuss the implementation aspects of CAMPUS without discussing, a bit, the nature of CAMPUS.

Figure 1 shows the input to CAMPUS as being of four types:

1. structural definitions
2. policy/planning factors
3. student enrollments
4. inventories

Structural definitions are used to "define" the insti-

Figure 1



tution to CAMPUS. These enumerate, for example, the cost centers (the organizational groupings of the model) and their relationships, the types of spaces, types of staff, program classification structure, budget functions, and other parts of the framework of the data to the model.

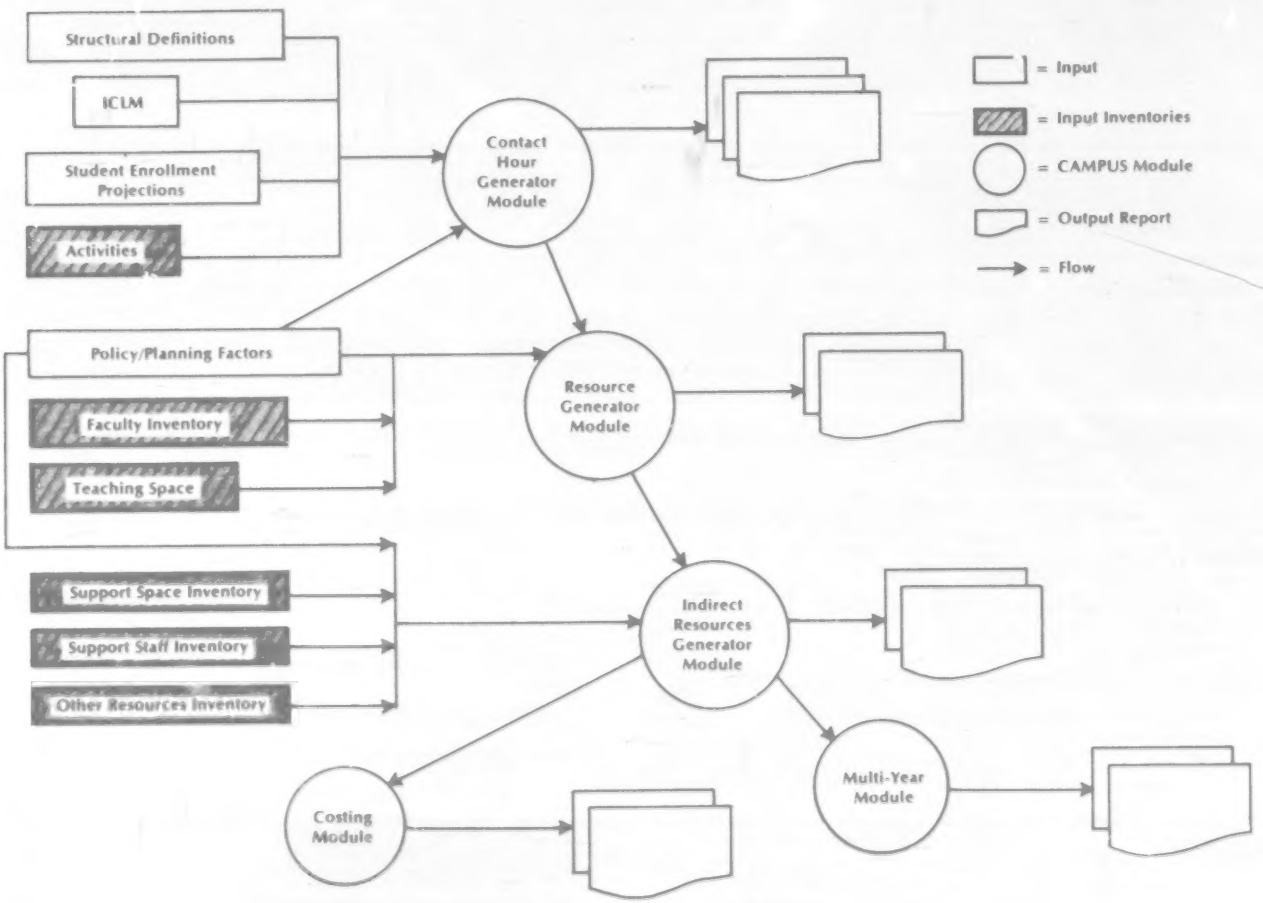
Planning factors are the expressions (variables, coefficients, and relationships) which are used in projecting resource requirements. These can be input for each resource type at each cost center. *Policy factors* are coefficients which are input to modify resource requirements according to planned restrictions, expansions, or qualifications.

Student enrollments are the projections which load the model. While CAMPUS has a student flow model built in as an option, these can also be input for each year of a simulation from an external analysis.

Inventories is a generalized term for "what is." It includes physical space inventory, staff inventory, other resource inventory (non-personnel operating costs), and the inventory of activities offered. (An activity is one component of a course, i.e. lecture, lab, recitation.) These inventories are used in the model to show how estimated resource requirements relate to existing or base year figures. It also allows for the requirements to be "adjusted" over compatible types of resources (a small class meeting in a larger room).

Figure 2 shows in more detail how the input relates to the various modules (or parts) of CAMPUS.

Figure 2



The magnitude of data elements required in CAMPUS is massive. The 1800 courses in one term on the Boulder campus contained 2040 different instructional activities in Fall, 1971. Forty-seven types of staff are defined and require identification of inventory, average salary, and planning factor information in 100 cost centers. Building space is defined by 70 types to be inventoried and planned for in 75 space control centers (specially designated cost centers). Other nonpersonnel resources are defined into 56 types in 100 cost centers. There are 250 student programs (a defined student emphasis [major] which leads to a degree, certificate, or some other stated objective) at C.U. at Boulder, which means that its induced course matrix is 250 programs by 2000 activities by six student levels. One can quickly conclude that this is a nontrivial amount of information. I'd like now to discuss how we approach this data collection process, understanding that it has to be done every year, without panic.

About the Data Systems

Wherever possible, computerized data collection / conversion systems have been developed. It is my intent to serve four major purposes by this approach:

1. The amount of *hand work* necessary to generate the input to CAMPUS is reduced.
2. *Intermediate reports* are produced automatically.
3. All input documents to CAMPUS where manual coding is also necessary are produced automatically with existing information *pre-coded*.
4. A *direct link* is provided with operating management data systems.

The reduction of hand work carries significant impact in a project the size of CAMPUS at Boulder. The time required to code the input would not only be long, it would be prohibitive; and even a minor error rate in keypunching could carry significant alteration of the results.

During the conversion of operational data to CAMPUS input data, intermediate reports are produced which record this data as it is being converted. This intermediate reporting is needed for auditing, checking, and basic information purposes. Even though CAMPUS is detailed, there is still substantial aggregation in some areas. For example, in the University's personnel system over 200 actual job class codes are reduced into 47 types of staff for CAMPUS input. Data gathered is also "massaged" to produce new *kinds* of data. Thus, CAMPUS forces us to look at the data as we had never done in the past, and we needed an audit trail to "find our way."

When the conversion of data is complete, this data is recorded on a report which becomes the input coding document to CAMPUS. Thus this data is *pre-coded* allowing for the insertion manually of planning factor information. These reports produced by the computerized data collection systems precisely parallel magnetic tape files of the actual input to CAMPUS. Planning factors are added manually to the reports and these reports become the input coding sheets to CAMPUS. These manual additions are then keyed on to the tape using a Viatron System 21.

The *direct link* with operating systems initially provides a communications link with people working at the operational level in two ways. First, it more clearly informs the data system designers of the analytical needs of the planning staff. This serves the long range goal that the "institutional analysis files are based on operating data systems . . ."[2] Secondly, this serves as the validation base. More will be said about validation later.

Examination of the operating systems revealed that they were supportive of most CAMPUS data requirements for the basic inventory systems, as well as the induced course load matrix (ICLM).

Figure 3 shows the flow of the data to the CAMPUS model. Aside from the policy / planning factors, the other manually generated input represents less than 0.5% of the input.

Some details of one of the automated inventory systems is described below as an example. Each of the systems is designed to take existing University operating files and summarize the pertinent information to produce either direct input to CAMPUS or partially completed reports which serve as coding documents with corresponding magnetic tape files.

Other Resources System

Other resources are all non-salary operating expenditures.

The Other Resources Inventories are generated directly from the year-end Debit and Credit Register maintained by the Finance Office which reflects the actual expenditures for the fiscal year.

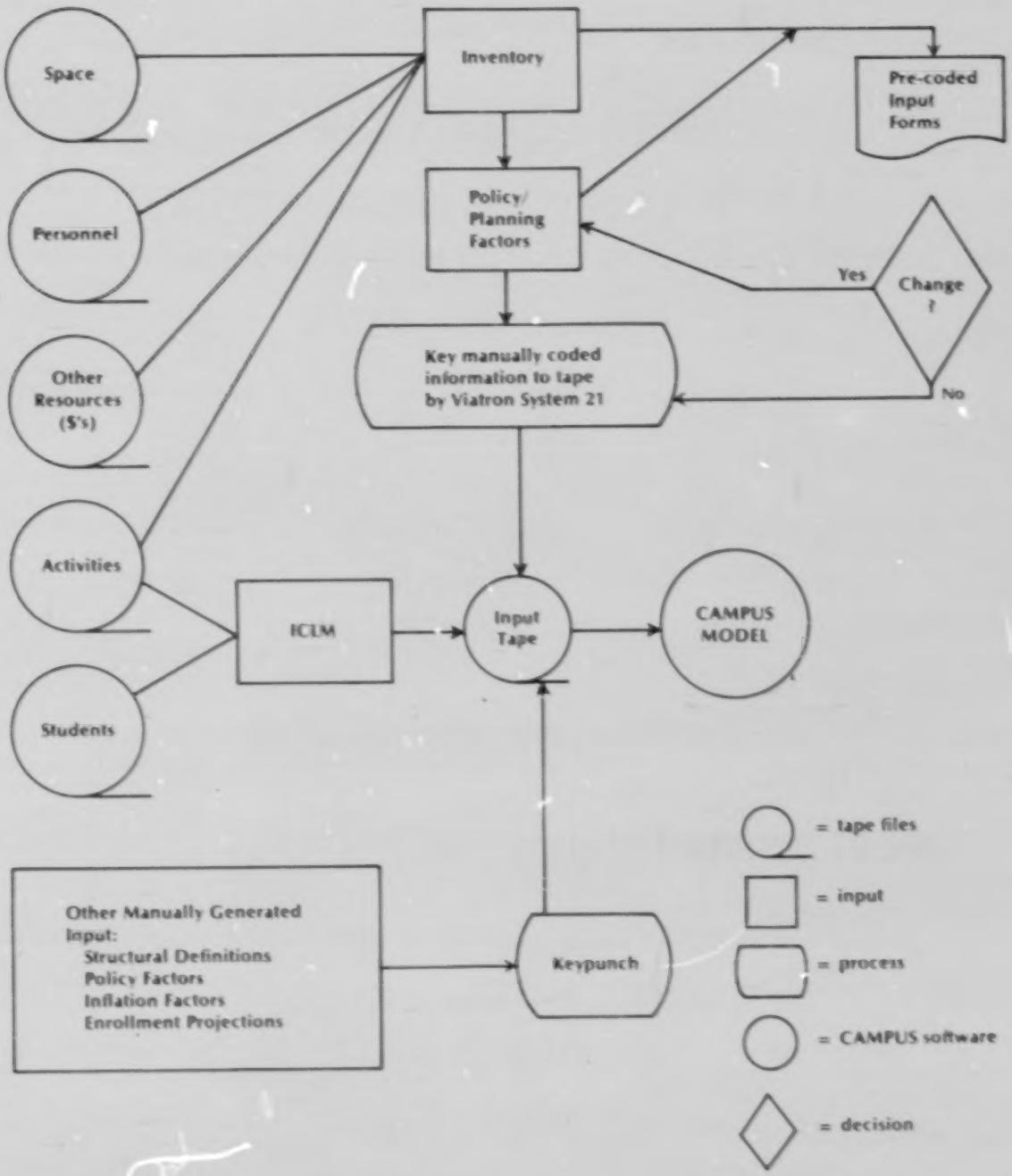
Two translations are necessary:

1. the account number translation to the appropriate cost center;
2. the object of expenditure code translation to the appropriate other resource type.

The expenditures are then summaryized for each other resource type by cost center. For checking purposes, all salary expenditures recorded are also summarized for each cost center and recorded in an intermediate report. *Pre-coded* input records to CAMPUS are generated.

There were, of course, many problems which beset those best laid plans of mice and people. The first was that the elements within the data systems were not consistently defined. This is a problem which can only be solved by the long range approach of common definition development and adoption. At the University of Colorado, Administrative Data Systems is working in this area. It is our hope that as these systems are redefined, the operation of data collection for CAMPUS will become a normal spin-off from the

Figure 3


Space
Personnel
Other Resources ($'s)
Activities
Students
Inventory
Pre-coded Input Forms
Policy/ Planning Factors
Yes
Change ?
No
Key manually coded information to tape by Viatron System 21
ICLM
Input Tape
CAMPUS MODEL
Other Manually Generated Input:
Structural Definitions
Policy Factors
Inflation Factors
Enrollment Projections
Keypunch
= tape files
= input
= process
= CAMPUS software
= decision

operating systems and be performed by the data processing and operating department staff; thus, totally closing the gap.

Another data problem was finding historical data consistently maintained for one year to provide a base case for validation. Our first selection of 70/71 for a base year had to be changed to 71/72 when it was discovered that in 70/71 a census student course registration tape had not been kept.

Figure 4

CAMPUS DATA COLLECTION DOCUMENTATION LOG SHEET

Subject Area (check appropriate):

Date _____

Author _____

Description (if pertinent):

_____

_____

_____

_____

_____ **General**
_____ **Budget**
_____ **Cost Center**
_____ **Faculty**
_____ **Non-Teaching Staff**
_____ **Space**
_____ **Other Resources**
_____ **Activities**
_____ **Programs**
_____ **Enrollments**

For Command Code (if pertinent): _____

_____

Items

_____

Distribution List No. _____ **RF01.1**

About Validation

"Validation holds a special and important role in simulation." While it is easy to believe in the "black box" of the model, unless the inputs can be related to familiar data, the user cannot and will not use the model because he or she will be unable to interpret projection data. Our basic choice of working with operating data systems, even though many problems were inherent in this approach, was to make it possible to clearly define every path of data aggregation and/or development. The intermediate reports of the data gathering system have proved invaluable. Understanding the data which drives CAMPUS will lead in the long range to an understanding of CAMPUS itself.

About Documentation

There is a step which becomes the lifeblood of an operation once it has gone beyond the first few months — documentation. Dealing with a system as large as CAMPUS, it was immediately evident that as much as possible should be documented. But how do you work that mundane and time-consuming operation into a dynamic situation? By doing it along the way. By providing an easy mechanism by which any staff member can quickly and without much bother record events. The only real problem encountered at C.U. was reminding staff that documentation had to be done! Figure 4 shows a form which was designed for the purpose of fast documentation — free form in the documentation area, but structured so that only a checkmark made it "fileable" and "findable." This form, along with a similar one for recording telephone conversations with SRG (Systems Research Group), has successfully captured the "history" of the project's decisions and analy-

sis techniques.

About Communication

The activities of data collection and validation are, of course, only the first part of implementing a model. Communicating with the users of a model is critical. "In most complex organizations — including colleges and universities — the executive officers, governing boards, operating managers, and policy committees are the ultimate users of analytical models."[4] Communicating with these groups has consumed much time and energy particularly since the State of Colorado is also involved in our communication program.

The use of transparencies provides a structured and formal format in presentation but allows for great flexibility in the development of presentations. Five sets of transparencies were developed by Visiting Professor K.M. Hussain of the University of New Mexico:

1. General information on CAMPUS.
2. Introduction to CAMPUS / COLORADO
3. How the model works.
4. Implementation of CAMPUS.
5. Comparison between CAMPUS and RRPM.

A document which explains how CAMPUS works was designed by Professor Hussain as a "stand alone" and includes problem work sets for greater understanding. In addition, video-tapes were recorded on the general introduction to models (in addition to the five presentations above) and the comparison between CAMPUS and RRPM.

These presentations have been used with many audiences across the University community and the State.

Currently, however, we are working with four pilot departments on the Boulder Campus by extending to them detailed, hands-on experience with the model for themselves. This is being done jointly with the Committee on Academic Planning (of the Faculty Council) in support of an evaluation study of these four departments. By providing the additional data available from CAMPUS to these departments in the open framework of faculty committee project, it is hoped that our communication will be amplified in a natural and positive way.

Our only concern at this point is that we should have communicated sooner with the faculty. "However, we believe that it was necessary to have the computer software and the existing data basis in 'fair' condition before we started discussions with the faculty."[5]

Some Facts and Figures

The first year of implementation has included not only those items described in this paper, but also system development of CAMPUS itself. We purchased CAMPUS VI with the understanding that it would be modified to include such things as program costing. This was accomplished along with the conversion of the programs to run on the CDC 6400. These development costs are included in the implementation costs presented below.

Direct Costs from March 1972 to Feb. 1973: $61,000
Estimated Staff Costs from March 1972 to Feb. 1973: $40,000

In Summation

Why we chose to go the detailed route of CAMPUS is adequately covered elsewhere. We did go this route and believe that the implementation design will permit the detail to be handled automatically while allowing for greater flexibility in planning down to the department level. We also believe this approach to implementation will lead to the slow absorption of CAMPUS / COLORADO into the operational parts of the University where its impact will be most useful.

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SIMULATING THE UNIVERSITY: AN EVALUATION OF EXPERIENCES WITH THE CAMPUS, HELP/PLANTRAN AND SEARCH SYSTEMS

Jerome F. Wartgow, Governors State University

Recent years have seen much activity in simulation modeling for research and planning, and several organizations have developed simulation models designed especially for use by administrators of higher education. Although the power and sophistication of this tool have been proven in areas of business and government, many questions remain to be answered about the effectiveness of these models as an aid to administrators of higher education.

The ultimate goal of this application of the technique of simulation has been to enable colleges and universities to make more rational decisions about the use of their own resources and the direction of their development. Rourke and Brooks have found that the extent to which this expectation has been fulfilled in higher education is as yet far from clear. While the literature reveals many articles referring to the use of simulation as something of a panacea, other writers have expressed doubts concerning the suitability of its application at a level of complexity comparable to that of administering a university.

As the number of colleges and universities using simulation models continues to rise, it becomes increasingly important to examine objectively the reactions to this new science. This paper provides an assessment of the utilization of three computer simulation models now being applied to administrative problems in selected institutions of higher education.

Method of Procedure

The problem of evaluating the use of simulation systems was approached through an examination of the experiences reported by colleges and universities that had implemented and were utilizing simulation as an administrative tool.

A sampling technique was used to achieve the following objectives: (1) the selection of the institutions which represented a variety of organizational structures, types of methods of utilizing simulation models, and (2) the selection of computer simulation systems that were representative of those most widely used by institutions of higher education.

The criteria applied were as follows: (1) the institution must have had implemented the model at least one year prior to the date of the study, (2) the simulation model being used must have been readily available and adaptable to utilization in any institution of similar size and organizational structure, and (3) the institution must be an institution of higher education in the United States.

When the criteria were applied to the institutions, it was readily determined that only three simulation models would be involved in the study. These models were identified as: (1) CAMPUS, developed and implemented by Systems Research Group, Toronto, Canada, (2) HELP / PLANTRAN, developed and implemented by Midwest Research Institute, Kansas City, Missouri, and (3) SEARCH, devloped and implemented by Peat, Marwick, Mitchell & Co., New York, New York.

The final sample consisted of (1) a total of eight institutions, (2) each of the three simulation systems being utilized by at least two institutions, and (3) a variety of institutional sizes and types, including two large private universities, a two-year college, a private women's college, a state university system, and three small private liberal arts colleges. The sample is not random, but rather a representation sample of institutional types and the simulation models they were utilizing.

The study incorporated accepted descriptive-survey research procedures in the collection and analysis of data. Personal semi-structured interviews were conducted at each of the participating institutions and experiences with the respective simulation models were analyzed under the headings of: (a) factors influencing the purchase and implementation of the model, (2) experiences during implementation, (3) means and methods of utilization, and (4) the extent to which the simulation model had achieved its objectives.

Findings

While experiences during the implementation and utilization of computer simulation systems varied from college to college, certain common factors were identified which appeared to contribute to the extent of successful utilization. Based on these findings a number of conclusions and recommendations were drawn, the more significant of which are summarized below.

Two primary factors were identified which influenced the decision to purchase and implement a computer simulation model: (a) the effort of an individual on the university staff who had a personal interest in new techniques of management, and (b) a recognized need by university personnel for a tool to assist in answering "what if" types of questions.

Two inferences may develop out of these findings. First, it might be inferred that the technique of simulation is so new that its existence is not common knowledge among administrators of higher education. As a result, the use of simulation is promoted by that type of individual who is aware of and interested in innovative managerial techniques generally.

A second inference might be that the relevance of simulation to administering higher education will not be generally recognized until the planning process on the campus has progressed to a point where administrators are forced to decide between alternatives and are aware of the need for information concerning the implications of choosing one alternative rather than another. At that time simulation will be recognized as a useful tool in assisting decision-making.

Once purchased and implemented, simulation models were utilized more extensively in those institutions which purchased the system to meet a recognized need, than in those institutions which purchased the system primarily because of the recommendations of an administrative "innovator."

No discernible pattern was evident concerning the decision to purchase one of the models in preference to another, although it was clear that much of the discussion centered on choosing a model of appropriate complexity.

The confusion over the desired complexity or simplicity for a given simulation model reinforced a general limitation of simulation that can be identified in the literature. That is, that in order to represent the system accurately, there is a tendency to develop more complicated models. As models become more complicated they become less easy to understand and thereby defeat the purpose of constructing a model (i.e., simplification of the real system to facilitate understanding).

Experience Reported by Institutions During Implementation of the Model.

The time to make the system operational was significantly underestimated in each implementation. Several problems were identified as contributing to this condition. The first and most significant was that considerable modification was required to several of the models prior to utilization. This factor may have far-reaching implications for the use of simulation in higher education. It might be inferred that "simulation packages" specifically designed for one institution are not readily adaptable to other institutions. This inference would support arguments advanced by some administrators concerning the "uniqueness" of higher education and the resultant inapplicability of scientific management techniques.

However, when the findings leading to this conclusion are examined carefully, it appears that another inference might be more valid. That is, that the immediate modification in models arises from the fact that the sophistication of the user has not developed to a point where he can identify appropriate and inappropriate users of the model. A review of the literature strongly indicated that the value of any simulation system is largely dependent upon the ability of the user to determine situations in which it is appropriate. Extensive modification of the system might imply that simulation was being applied to problem for which it was not appropriate.

A second factor that was identified as contributing to the length of time involved in implementation is the inexperience of the personnel responsible for using the system. The assumption that a person with no prior experience with simulation or computers can operate a simulation system would appear to be invalid. The findings of the study indicate that inexperienced persons may implement the models eventually, but that if simulation is to be conducted efficiently, the user must have had some prior experience in the use of simulation or computers, or both.

A misunderstanding of what the term "implementation" implies may have been a third factor which contributed to the discrepancy between actual and estimated implementation time. Quite possibly, implementation has a different meaning for the firms installing the simulation model than it does for the institutions that are utilizing model.

Institutions that relied primarily on university personnel during implementation experienced more difficulty than institutions that utilized the services of the firms that developed the models. The least difficulty during the implementation was reported by those institutions that contracted the entire implementation to outside personnel. Generally, the problems encountered during implementation were in the areas of data collection and computer technology.

A lack of wide and active participation by university personnel during initial stages of implementation appeared to influence the extent of future utilization of the model.

From this finding it may be inferred that partici-

pation leads to a fuller understanding and eventual acceptance of the model. This would support the argument that resistance to the utilization of "Scientific Management techniques" stems mostly from men who misunderstand the nature of modern administration. Further, in those instances when participation in the development of the model was limited, and use was also limited, one might infer that the model was comparatively unsuccessful as a result of misunderstanding on the part of those who were not involved.

In-service sessions and in-service materials influence the extent of utilization of simulation models. In addition to increasing the number of sessions and personnel involved, there was seen to be a greater need for improving the content of some of the in-service sessions. Consideration and discussion of the "human element" as it related to the use of simulation was seen to be as important to successful model utilization as technical considerations.

Means and Methods of Utilization

Simulation was most extensively utilized when a formal planning process was in operation at the university prior to its implementation. The case reports suggested that implementation of a simulation model prior to proper preparation tended to complicate rather than clarify its role in the overall planning process. In this regard, simulation was not a substitute for planning but rather a tool to be used to supplement the planning process.

It seems clear that simulation will have relevance and applicability to higher education only when a less sophisticated system of planning has already been used successfully, and when the acknowledged need for further and more detailed analysis leads to an understanding of the specific circumstances in which this technique is appropriate.

The amount of confidence placed in the accuracy of simulation results (by those persons in a position to make decisions based on these results) was found to be a function of broad participation by the institution's personnel in the development of the model and confidence in the individual conducting the simulation. Greater confidence among the users of simulation results was noted when there was wide and active participation in the development of the assumptions and formulas used in the model. Additionally, confidence held by university personnel in the ability of the administrator responsible for conducting simulation was found to be correlated to confidence in the simulation itself.

The accuracy of the base data in the initial use of the model tended to influence the extent of future utilization as well as the degree of use confidence in future simulations. University personnel often view the initial use of simulation with cautious skepticism. The careful collection of accurate base data will enhance the potential for successful utilization and consequently help overcome the skepticism.

Based on the findings of the study, it was not possible to draw any conclusions concerning the most appropriate institutional office to be responsible for primary utilization of the model.

However, one observation may be relevant. Generally speaking, it appeared that the personal and political influence of the indivicual having responsibility for the simulation model was a more significant factor in successful utilization of the model than the position which he occupied.

Insufficient time to devote to planning was identified as a major impairment to the utilization of simulation models.

Conclusions

Generally speaking, it is suggested that those persons who are responsible for development and/or use of university simulation models evaluate the model in terms of four basic criteria.

PERFORMANCE - How effective is the model in getting the answers I want?

UTILITY - How useful is the simulations system? How often will it be used? Is it flexible enough to accept major changes in organizational structure? How many people can make use of it?

TIME - What is the time required for installation? How much time is required for collecting base data necessary to operate the system? What is the time required to retrieve information?

COST - Is the value of the information worth the cost of implementation? Will it save money in terms of time and personnel? Do we really need one at current costs?

If the criteria are applied to each of the available models, much frustration will be eliminated. Additionally, if persons who are responsible for building new models utilize these criteria, the potential of simulation for administering higher education will increase significantly. Overall, experiences to date have indicated that the time and expense involved with simulation models have not been justified in terms of the extent of their utilization. However, this conclusion must be considered in the context of the following qualifications: (1) an important benefit of the utilization of these models is that attention of focused on long-range planning, (2) the models have the greatest potential of becoming a valuable and appropriate tool in institutions which are in a process of change, and (3) the value of computer simulation models in higher education is dependent upon the ability of the user to recognize situations in which this tool is needed and appropriate.

When there was an existing and recognized need for a tool to assist in determining the impact of alternative courses of action, the model was seen as a relevant and

applicable tool. On the other hand, when models were applied to a problem prior to a need for the tool being evident, major difficulties were encountered.

In the opinion of administrators who used simulation, efficiency of utilization will increase as the user becomes more familiar with the advantages and limitations of the system. Additionally, there was an expressed "feeling" that, just as during implementation of any new administrative technique, a certain time factor is necessary to work out problems, gain the confidence of the staff, and overcome resistance to change.

As these conditions are met and proper preparations made, computer simulation models will have the potential of becoming a valuable administrative aid. With the passing of time and the satisfaction of certain other stipulations which have been identified above, the potential should be achieved. At that time, the use of computer simulation models in the administration of higher education will provide valuable assistance in the task of more efficiently allocating institutional research.

Recommendations

In an attempt to capsulate my opinions concerning problems and prospects of computer simulation models, I have formulated a series of recommendations. Empirically speaking, I would say that consideration of these recommendations by institutions planning to proceed with development and/or implementation of a computer simulation system will help eliminate some of the problems and brighten some of the prospects.

A specific need and a high level commitment to planning should be generally evident in the institution prior to implementation of a computer simulation system. What happens on campus prior to implementation is just as important in terms of successful utilization as what happens following implementation.

An institution should carefully select a model or system that is best suited to the unique needs of the individual college or university. Care must be taken to insure that the model is not too simple to represent the institution adequately or too complicated to be easily understood.

An institution should take care lest it underestimate the time necessary to make the system operational following the decision to purchase. Experiences reported indicate that the time necessary to operationalize the system is generally significantly longer than the initial estimate.

An institution or installing agent should define and clarify what is meant by the terms "installing," "implementing," and "operationalizing" the model. Experience has shown that these terms often have a different meaning for the firms installing the model than for the institution that is using the model.

An institution should encourage wise and active participation and involvement with the model from the outset. Lack of participation by the institution's personnel in the development of assumptions and formulas to be used in the model is a strong predictor of unsuccessful utilization.

An institution should employ a person to physically operate the system who has prior experience with models, computers, or both. The findings of the study indicate that, contrary to prevalent assumptions, a person with no prior experience in these areas cannot efficiently operate the system.

An institution should employ the services of one of the professional firms to implement the system. Experience has shown that this may be less costly than attempting the task solely with college or university personnel.

An institution or installing agent should thoroughly discuss the rationale for any initial major technical or conceptual modifications in the models. It may be possible that the model is not appropriate for the institution, or more likely, that the problem being approached is not appropriate for the model.

An institution should be prepared to evaluate in-service sessions and in-service materials to be sure that the content as well as the number of sessions is adequate to meet the needs of the institution. In-service sessions should deal with "human elements" which may cause problems during utilization, as well as technical details necessary to operate the system.

An institution should provide adequate time for the administrator who is responsible for utilizing the model to perform this function. Experience indicates that purchasing a system and giving it to an administrator as a "spare-time" activity is a poor investment.

An institution may establish confidence in the results of the system by placing the model in the office of an administrator whose judgment is respected and who has an appropriate level of personal and political influence and prestige within the institution. Although this may cause problems if the individual leaves the institution, experiences indicate that the confidence that university personnel have in future simulations is positively correlated to the confidence obtained as a result of the initial utilization.

An institution should take extreme care in the collection of base data to be used in the model. Do not attempt to conduct any studies with the system until the staff has complete confidence in the validity and accuracy of the base data. If the institution is not experiencing major change of one form or another, it should carefully weigh the value of a computer simulation model against the time and expense involved in its purchase and implementation.

An institution should only use the system in areas for which it is more appropriate than other techniques. The ability to determine when simulation is, and is not appropriate, is the primary determinant of its value to the institution.

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RESOURCE PREDICTION MODELS: A DO-IT-YOURSELF APPROACH FOR INSTITUTIONAL RESEARCHERS

Webster C. Cash, Fisk University

No well-informed administrator questions the virtuoso attributes of the well-known simulation models. Yet their potential utility is questionable in many institutions. The anamoly is easily explained. The models tend to be internally driven — especially by enrollment. But the crucial issues for today's colleges and universities tend to be external: attitudes toward higher education, national economic fluctuations, demographic trends, the vagueries of politics. These are issues which require solid research and continuous monitoring if their influence upon a particular institution is to be understood. Such research and monitoring often are inadequate or wholly lacking. One is surprised to find in the modern world college officers and governing boards who perfer envelope backs to research studies, but they are plentiful in smaller institutions and not unheard of in major universities. However reluctant top management may be, colleges and universities are now being forced by circumstance to pursue will-o'-the-wisp, modern management techniques. Their initial forays sometimes are into simulation models. At times, and perhaps frequently, the results must reaffirm our favorite aphorism, "garbage in, garbage out."

The developers of elaborate simulation models stress that the utility of the models is constrained by the data fed into them, and that data on the future are especially elusive. NCHEMS, for example, in its "A Blueprint for RRPM 1.6 Application" (WICHE, February 1973), warns:

> The fifth step of the implementation process involves the difficult task of developing alternative sets of specific planning decisions that use the status quo reports as a point of departure. Many individuals including faculty, students, lay boards, and administrators will probably play a part in this process of developing alternative plans. The technician must be available to the decision makers to translate their decisions into the required RRPM input data formats and to carry out the sixth step, which is making the RRPM projection runs for each alternative set of planning decisions.

Others besides NCHEMS have already pointed effectively to the need for good historical data and soundly conceived future data if simulation models are not to be misleading, even dangerous, as decision-making tools.

How are the dangers reduced or avoided? One way is for the institutional researcher to take the lead in developing simulation models which are easily understood by officers and governing boards, and which are tailored to a particular institution's circumstances and policy issues — a do-it-yourself approach.

In 1972 we developed at Fisk a do-it-yourself model for Fisk's financial projections even though we knew that in 1973 we would begin operating the NCHEMS Induced Course Load Matrix, the RRPM 1.6, and the Cost-Finding Principles. The model immediately proved valuable in resolving policy issues. It is still valuable as a complement to the three NCHEMS systems, which are now operating.

The need for projecting the operating budget into the future was perceived toward the end of the innumerable long, dreary, depressing meetings of administrators and senior faculty in which we refined our knowledge of the University's academic and fiscal problems. We were concerned that a trend of financial deterioration beginning in the latter 1960's might not be reversed quickly enough, and we were dissatisfied with our lone five-year financial projection. We needed to explore alternative fiscal paths and we chose to do so by developing a model which would simulate Fisk's operating budget five years into the future.

The Model and the Computer Program

Examine Exhibit One. The items on the left are the major parameters which concerned us as we discussed the University's finances. They are, I believe, typical of the major fiscal concerns in most small institutions. Each item in Exhibit One is subject to change either by policy

revision or by the influence of national conditions. Hence these items became variables in the model. They are independent variables — that is, each can vary independently or other variables, and none of them are determined by the others. A change in any independent variable affects one or more items in the operating budget as well as the budget totals. The dependent variables are the line items of the budget.

Fisk's budget officer then sketched the model. Its essence is to specify precisely what dollar changes will occur in the operating budget as a result of a change in any independent variable. Drawing from his knowledge of our recent financial experience, he completed that task in a few hours. The following weekend he transformed the model into a computer program.

The elements of the model are:

(1) The Fisk budget for 1972-73 (major categories only) supplies the base amounts from which the amounts for future years are calculated.

(2) Each major category in the operating budget is projected through the five-year period ending with 1977-78.

(3) In each trial projection, quantities are set for each of the following 20 independent variables — whatever quantities the user of the computer program chooses— which become inputs into the computer program. See Exhibit One for an example.

a. Enrollment.
b. Student-faculty ratio.
c. Net square feet used in activities budgeted against educational and general items.
d. The minimum number of square feet of education and general space permited for each student; this permits a calculation of enrollment capacity.
e. Tuition and fees per student.
f. Room and board charges per student.
g. The dollar income from federal programs each year, distributed between:
   (1) Ninety percent to the revenue item "sponsored research and programs."
   (2) Ten percent to the revenue item "indirect costs."
h. Expenditures of federal program funds, divided between:
   (1) Percent supporting Fisk's regular, on-going programs of instruction and administration (all of which are E&G items).
   (2) Percent supporting institutes, research, and other activities which are not fundamental to Fisk's regular, on-going academic and administrative programs.
i. Endowment value.
j. Percent of endowment value used as endowment support.
k. Private gifts and grants allocated to the operating budget — excluding amounts budgeted under the new Ford Development Program, and gifts and grants for capital programs.
l. Income from the Ford Foundation's Development Program allocation to the operating budget.
m. Federal subsidies to higher education institutions, as estimated on the basis of Higher Education Act of 1972.
n. An inflation factor affecting all expenditure items.
o. Percent increase per student for instructional improvement over and above increased costs resulting from inflation.
p. Average faculty salaries.
q. Library expenditures calculated as a percent of total E&G expenditures.
r. Expenditures on financial aid to students, expressed as a percent of income from tuition and fees (this is called "full-aid equivalent" because it is equivalent to the percent of students on financial aid if every financial aid package consists of the full cost of tuition, fees, room and board, and if no smaller packages were awarded).
s. An efficiency factor for administrative expenditures — allowing real costs (that is, dollar expenditures measured in constant dollars) to be adjusted downward as administrative resources are used more efficiently.
t. Number of students residing in dormitories.

(4) A set of simple equations instructing the computer how to use these inputs to calculate the "correct" amount for each major item of the operating budget in each year through 1977-78.

(5) The resulting calculations for each trial projection, shown on a computer printout as Fisk's operating budget (major categories only) each year from 1972-73 through 1977-78.

Some 40 different projections — each with a different set of input data — were run on the computer. Only one of these projections is reproduced here in the three exhibits.

The Base Projection: Current Policies

To understand the starting point for the projections, the reader should examine the exhibits. This "base projection" is a test of the feasibility of Fisk's present policies if they were to remain unchanged over a five-year period. The data and assumptions for the base projection were selected according to three criteria:

First, that all decision-making until 1978 will be in accordance with Fisk policy as established in the summer of 1972;

Second, that in matters not governed by policy, the assumptions used as inputs in the computer program

Exhibit 1

TRIAL PROJECTIONS OF OPERATION BUDGET
PROJECTION NO. 1

PURPOSE. To test the feasibility of existing policies combined with conservative estimates of future trends.

Input of variable data	Budget * 1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	Five-Year Increase or Decrease
Non-monetary:							
1. Average enrollment	1500	1575	1650	1725	1725	1725	+ 15%
2. No. of F.T.E. faculty	110	108	108	108	108	108	-2%
3. Ratio of students to faculty	13.6:1	14.6:1	[illegible] 3:1	16:1	16:1	16:1	+ 18%
4. Net square feet to E&G uses	190,000	200,000	[illegible],000	230,000	240,000	[illegible]50,000	+ 26%
Revenues:							
5. Tuition & fees per student	$1750	$1855	$1965	$2085	$2210	$2340	+ 34%
6. Room & board fees per student	$1225	$1285	$1350	$1420	$1490	$1565	+ 28%
7. Federal sponsored programs	$2.0 mi.	$2.2 mi.	$2.3 mi.	$2.4 mi.	$2.5 mi.	$2.6 mi.	+ 30%
a. % to indirect costs	10%	10%	10%	10%	10%	10%	constant
b. % to institutional support	35%	35%	35%	35%	35%	35%	constant
8. Endowment value	$7.4 mi.	$7.4 mi.	$7.4 mi.	$7.4 mi.	$7.4 mi.	$7.4 mi.	0%
9. Ford Development Program	$700,000	$530,000	$405,000	$305,000	$155,000	$155,000	-78%
10. Total private gifts & grants excluding Ford Development Program	$1,295,096	$1,419,000	$1,180,000	$1,162,000	$1,139,000	$1,357,000	+ 5%
11. Federal subsidies to private colleges	0	0	0	0	0	0	0%
Expenditures:							
12. Inflation factor for all expenditure items	5%	5%	5%	5%	5%	5%	+ 28%
13. % increase per student for instruction improvement	2%	2%	2%	2%	2%	2%	+ 10%
14. Average faculty salaries	$14,150	$15,140	$16,200	$17,334	$18,548	$19,846	+ 40%
15. Total faculty salaries	$1,556,580	$1,635,120	$1,749,600	$1,872,072	$2,003,184	$2,143,368	+ 38%
16. % of student body awarded financial aid (full-aid equivalent)	30%	30%	30%	30%	30%	30%	0%

*The budgeted amounts for 1972-73 were preliminary; they later were revised substantially.

Exhibit 2

FISK UNIVERSITY
TRIAL PROJECTIONS OF OPERATING BUDGET
PROJECTION NO. 1

PURPOSE. To test the feasibility of existing policies combined with conservative estimates of future trends.

REVENUE	Budget* 1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	Five-Year Increase or Decrease
Education and General:							
Tuition & Fees	$2,593,775	$2,775,543	$3,080,137	$3,416,793	$3,621,637	$3,834,674	+ 48%
Sponsored Research & Programs	1,803,530	1,980,000	2,070,000	2,160,000	2,250,000	2,340,000	+ 30%
Endowment Support	445,200	472,340	472,340	472,340	472,340	472,340	+ 6%
Gifts & Grants (excluding Ford Dev. Pro.)	1,295,096	1,419,000	1,180,000	1,162,000	1,139,000	1,357,000	+ 5%
Ford Foundation Development Program	700,000	530,000	405,000	305,000	155,000	155,000	-78%
Federal & Tenn. Institutional Subsidies	0	0	0	0	0	0	0%
Indirect Federal Support	187,612	220,000	230,000	240,000	250,000	260,000	+ 39%
Other	334,746	351,481	369,057	387,510	406,885	427,230	+ 28%
Subtotal Education & General	$7,359,959	$7,748,367	$7,806,535	$8,143,644	$8,294,864	$8,846,246	+ 20.2%
Auxiliary Enterprises:							
Dining & Dormitories	$1,492,637	$1,586,374	$1,667,249	$1,753,699	$1,840,149	$1,932,774	+ 25%
Bookstore, Real Estate, Miscellaneous	268,420	287,918	316,710	347,662	365,045	383,297	+ 43%
Athletics & Radio	41,950	29,687	32,436	35,606	37,386	39,256	-6%
Subtotal Auxiliary Enterprises	$1,803,007	$1,904,301	$2,016,397	$2,136,968	$2,242,582	$2,355,328	+ 30.6%
Financial Aid:							
Subtotal Federal Grants (EOG, Work Study, Miscellaneous)	$ 852,230	$ 939,583	$1,033,541	$1,136,547	$1,191,274	$1,250,838	+ 46.8%
TOTAL REVENUE	$10,015,196	$10,592,331	$10,856,473	$11,415,159	$11,728,720	$12,452,412	+ 24.3%

NOTE. Subtotals and totals may vary slightly from the apparently correct amounts because of rounding.

*The budgeted amounts for 1972-73 were preliminary; they later were revised substantially.

Exhibit 3

FISK UNIVERSITY
TRIAL PROJECTIONS OF OPERATING BUDGET
PROJECTION NO. 1

PURPOSE: To test the feasibility of existing policies combined with conservative estimates of future trends.

EXPENDITURES	Budget* 1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	Five-Year Increase or Decrease
Education and General:							
Instruction & Organized Activities	$ 2,115,050	$ 2,203,591	$ 2,353,888	$ 2,515,022	$ 2,693,589	$ 2,884,834	+ 36%
Sponsored Research & Programs	1,372,961	1,287,080	1,345,500	1,404,000	1,462,500	1,521,000	+ 11%
Library	371,691	323,013	340,967	365,618	393,261	417,255	+ 12%
Student Services	616,082	646,886	679,230	713,192	784,511	823,737	+ 34%
General Administration	471,450	495,022	519,773	545,762	600,338	630,355	+ 34%
Development-Alumni-University Relations	189,380	198,848	208,791	219,231	230,192	241,702	+ 28%
General Institution & Staff Benefits	611,512	642,087	674,191	707,901	778,691	817,626	+ 34%
Physical Facilities	624,840	663,810	697,009	841,639	922,143	1,008,594	+ 61%
Subtotal Education & General	$ 6,372,966	$ 6,460,268	$ 6,819,353	$ 7,312,367	$ 7,865,228	$8,345,104	+ 30.8%
Auxiliary Enterprises:							
Dining & Dormitories	$1,467,176	$ 1,586,974	$ 1,667,249	$ 1,753,699	$ 1,840,149	$1,932,774	+ 32%
Bookstore, Real Estate, Miscellaneous	261,151	287,918	316,710	347,662	365,045	383,297	+ 47%
Athletics, Radio	106,985	117,950	129,746	142,425	149,457	157,024	+ 47%
Subtotal Auxiliary Enterprises	$ 1,835,312	$ 1,992,844	$ 2,113,706	$ 2,243,787	$ 2,354,742	$ 2,473,096	+ 34.8%
Financial Aid:							
Subtotal Scholarships & Other Grants	$1,706,873	$ 1,483,650	$ 1,640,925	$ 1,813,837	$ 1,914,750	$ 2,020,837	+ 18%
Contingency	—	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	—
TOTAL EXPENDITURES	$ 9,915,151	$10,186,762	$10,823,984	$11,619,991	$12,384,720	$13,089,087	+ 32.0%
Surplus of revenues over expenditures	$ 100,045	$ 405,568	$ 32,400	—	—	—	—
Additional revenues required	—	—	—	$ 294,832	$ 656,000	$ 636,625	—

NOTE: Subtotals and totals may vary slightly from the apparently correct amounts because of rounding.

*The budgeted amounts for 1972-73 were preliminary; they later were revised substantially.

should reflect our estimate of the conditions and trends which will prevail during the projection period; and

Third, that where "the most probable conditions or trends" are seen as a range of data in every year rather than as a single series of data, the assumptions should reflect conservative estimates — usually interpreted as changes causing income estimates to be near the lower side of the probable range, and expenditure estimates to be near the upper side of the probable range.

The resulting total revenue (Exhibit Two, last row) rose very modestly indeed — only by 28.1 percent in five years. This result deviated abruptly from the experience of the recent golden years. We looked for errors. None were found. There could be only one interpretation: that if Fisk policies should persist unchanged through 1977-78, and if our estimates of non-policy trends were not unnecessarily conservative, then the trend of large increases in revenue from all sources, seen continuously over more than a decade, had ended in 1972-73.

The increase in total expenditures (Exhibit Three, third from last row) was accounted for largely by the inflation factor. A five percent increase when compounded five years becomes 28 percent, and total expenditures rose only 38.2 percent.

The last two rows of Exhibit Three gave us the answers which we were seeking. The surplus of revenues over expenditures would have a short life, if any. The additional revenues required — a euphemism for the word "deficit" — would mount rapidly. The rise in the deficit was more dramatic than we had expected.

Fisk's position here differs little from that of most leading private colleges and universities which have analyzed thoroughly their financial positions. They are currently operating approximately in balance and they can even predict an occasional surplus. But their fiscal stability is, in the words of Mr. Cheit, fragile.

Our model had given us quantitative insights into the trends. Because of the considerable research that undergirded the projections, we felt that they were about as accurate as any projections can be. Something had to change — and quickly. The question was: What? And so we continued to run the program, altering the 20 variables.

Uses of the Do-It-Yourself Model

Our goal then became to discover a combination of policies which would keep the budget balanced without educational retrenchment. The model allowed us to seek a solution through an iterative process. After innumerable

computer runs, each of ten minutes duration, we chose a combination of policy variables, which we believed was an optimum combination. We did so in the light of several institutional studies concerned with major variables in the model. The variables so chosen became our recommendations on fees, enrollment, faculty, size, space, gifts and grants, and allocations to major expenditure categories. Many of the recommendations were incorporated in the budget for 1973-74, and some became University policy to 1978.

Comparison with NCHEMS Systems

The NCHEMS ICLM, the RRPM 1.6 and the Cost-Finding Principles are even newer to us at Fisk than is the do-it-yourself model. Our initial reaction to them is that the several models are fine complements to one another. Together they appear to give beautiful results for decision-making.

The RRPM 1.6 supplies cost detail in abundance such as the direct costs of programs, measures of faculty productivity, and requirements for non-faculty personnel. It lacks the indirect costs of educational programs and the costs of their research components. From our point of view, however, it has only one major deficiency: it is not concerned with income.

The NCHEMS Cost-Finding Principles, which converts expenditure data into program costs, yields results which are especially well suited to decision-making in years of fiscal stringency. Because of the considerable detail yielded by this program and by the RRPM 1.6, we view both of them as models or systems for the micro-analysis of costs.

By contrast, the do-it-yourself model involves only macroanalysis — a broad-brush treatment of budget projections — but it analyzes income as well as costs. Its advantages, we have found, are:

(1) That it was written to give specific answers to specific issues of a specific university;
(2) That it forces faculty, administrators, and trustees to face major issues of policy and to revise major assumptions while not bothering them with details which they might refuse to study;
(3) That its results are readily perceived and understood by officers and trustees — who are used to thinking in terms of major budget categories;
(4) That it supplies an analysis of income;
(5) That it has a quick turn-around time and is convenient to operate;
(6) That projections are not from unit costs — they are non-linear, allowing economies of scale and other fluctuations; and
(7) That it was inexpensive to develop and it operates at virtually no cost. (It was developed at a cost of less than $1,000 in the time of staff and about $50 for the cost of operating the computer.)

The do-it-yourself model's disadvantages appear to be:

(1) That it lacks the detail required to resolve numerous issues and policy matters (the NCHEMS systems supply much of this needed detail on the expenditure side);
(2) That when its results are misleading, this may not be apparent immediately; and
(3) That when its results are *prima facie* erroneous, it tends to conceal the sources of errors.

The Role of Institutional Research

The role of institutional research in planning at Fisk is to pursue studies which supply information and estimates about the critical planning parameters, to assist colleagues in focusing squarely upon the main issues of the day and of the future, and to interwine institutional studies and planning documents so that the two functions of institutional research and planning often are indistinguishable. We believe that the University benefits from this intertwining of functions, and we are beginning to amass evidence which will demonstrate these benefits conclusively. If the do-it-yourself model does indeed have the utility which we believe it has, and if the NCHEMS systems prove as useful in planning as we expect them to, these advantages should be attributed in some measure to the undergirding supplied by institutional research to the planning processes and to the intertwining of the two functions. Time will tell.

We have no major concerns about the NCHEMS systems, which are well-received on campus. We are pleased with them and with the do-it-yourself model. We know of course that such systems and models can be developed and operated with input data from envelope backs. But they deserve better treatment. As decision-making tools, they are not sufficient unto themselves. Healthy doses of institutional research are the missing ingredients, and they can best be supplied if planning and institutional research are intertwined or, better yet, if they are merged.

PLANNING-MANAGEMENT SYSTEMS IN HIGHER EDUCATION: WILL THEY REALLY MAKE A SIGNIFICANT CONTRIBUTION TO IMPROVING INTERNAL DECISIONS?

Peggy Heim, Bucknell University

Much attention has been given to the development of Management Information Systems and budgeting methodologies, including Programming, Planning, and Budgeting (PPB) and cost-finding principles. Much money has been spent on developmental programs. Even more may be spent on implementation.

It has been said that within a few years institutions will be required to submit data in NCHEMS form to qualify for any governmental funding. There is real question whether data of the NCHEMS magnitude and complexity are really needed by the government and whether their broad category statistical compilations that come out late are worth the total cost of data collection and preparation. Even more important is the question, Will the underlying Management Information System provide much useful assistance in internal decision-making? Please note that I distinguish between reality and theoretical possibility.

Those of us who have been involved, either directly or indirectly, in the development of large Management Information Systems may have become overly enthusiastic. We are like some corporate product-managers. We have done some market research in needs and wants, but we have given insufficient attention to ways in which the college may want to apply the product and to organizational environments in which the product a must be used. We have brought forth a tool designed for a flexible hand with an opposable thumb. But the organizations for which it is intended have only a paw.

There are various reasons Planning-Management Systems may have more benefits claimed for them than they can deliver. These reasons might be classified roughly as first, technical, and second, organizational, sociological and psychological.

Consider the technical reasons from the standpoint of the three main parts of a Planning-Management System — the data file, a package of standard reports generated from time to time, and a set of models and analytical packages, such as a resource prediction model and cost-finding programs.

The data file: For economic reasons the data file will not be, and should not be, complete. Completeness means that one has everything one could conceivably need. This often means coding things different ways — indeed, tens of different ways. They may also have to be broken down into component parts — not just one set of component parts, but many different sets, for even the same user may want the analysis prepared different ways. And each part will probably require several pieces of supplementary information for analytical purposes. Updating so large a data base becomes cumbersome and costly. The data user will therefore have to accept something less than what he wants or the additional costs of custom-tailoring analyses and reports. Either situation will reduce the usefulness of Planning-Management Systems.

Standard reports: We will discover that regardless of how many ways we count things, data users will claim they are not meaningful because something should have been excluded or something else included. On the other hand, if we produce all the variations that might conceivably be needed, users will be awash with reports. If overwhelmed, potential users will not refer to our products either.

Models and analytical programs: There are obviously questions on the usefulness of models:

First, modeling technology is best adapted to relatively static conditions, but we actually face a period of significant economic and social change. Major variables are changing rapidly — prices, wages and salaries, working conditions, modes of instruction, course patterns, and off-campus study to name a few. Results will be no better than the model itself. Even the more complex models and systems may yield disappointing results. This occurs because formalized models lack flexibility and versatility. Simulation models or cost-finding models are acceptable only if the players accept the rules of the game. There is considerable question whether the potential data users — the various administrators, department chairmen, and faculty members — want to accept the same rules. There is also doubt whether they even want to play the same game.

A second reason to question the usefulness of Planning-management Systems is that they understandably give considerable emphasis to cost-finding programs. These are average costs and average inputs. But the significant factors from the standpoint of internal decision-making are the incremental inputs, costs, and outputs. They may bear little

relationship to average costs or outputs. Moreover, the best we seem to do with measuring outputs is to count something, such as the degrees conferred by major, scores on graduate record exams, percentage entering graduate or professional school, and so on — crude devices for measuring quality.

A third criticism of simulation models and cost-finding programs is that they are too mechanistic. We focus our attention on the wrong factors and the wrong objectives. This occurs because we fail to define the problem properly. We are more likely to isolate a factor and then define that factor as a problem. Take faculty tenure as an example. The basic problem is not really one of the proportion tenured but of providing flexibility, vitality, and appropriateness of program. Tenure is only one part of a much broader problem. Its control therefore provides only one facet of a solution. Since individuals focus more easily on simple mechanistic factors than on complex problems, any system which facilitates a simplistic approach may inadvertently lead us down the primrose path. In overlooking the basic problem, we miss more effective solutions.

Even if we did not encounter these technical problems, there is another problem, namely the application of Planning-Management Systems in a complex social organization. Since you are familiar with the various requisites for the successful use of Planning-Management Systems, there are only two points I shall make.

First, the appropriate college administrators must be willing to come to grips with painful decisions, particularly the President. These decisions usually involve people. But too often decisions are not made. The institution drifts. Or because they involve people, the decisions are made the wrong way.

The second requisite is the distribution of responsibility, theoretical authority, and practical power. The introduction of Planning-Management Systems would be one thing in the classical organizational pattern (the pyramid) where authority is concentrated at the top, and delegated, along with responsibilities, to lower levels of administration and where job retention and salaries depend upon job performance. But our institutions of higher education are organized on a collegial principle carried to the point where many, if not most, institutions have administration by committee. The committees have mixed constituencies, depending upon the institution and the particular committee. In most institutions faculty continue to exercise strong, if not dominant, influence within the committee, and thus within the institution. It is important to note that most of the Committee members — the faculty — are employed to perform other functions, like teaching and research — not to manage the institution. Their jobs do not depend on how well they make administrative decisions. There are also many sociological reasons why they might not be expected to make hard decisions and to use management data in making them. But even if we are able to educate them, the committee membership changes. Each year we start the educational process all over again. In view of these problems I suspect it will take considerable time before educational institutions begin to derive great benefit from Planning-Management Systems.

We now come to the hard question: What can the institutional planner do? What should he do?

(1) Do not oversell Planning-Management Systems. Tell them how it might help them; but tell them how it might not.

(2) Do your own market research with key administrators. Attempt to identify problems which disturb them — problems which seem important to the administrator and which they believe should be tackled. Then try to assist them with data. If the administrator wants something calculated three more ways when you are already calculating it two ways, calculate it the five ways. The ones they are likely to use are the other three ways.

(3) Attempt to identify problems of critical long-run importance to the institution. What type of action you can help bring about once you identify the problems will vary from situation to situation. Three points should be kept in mind.

(a) Progress comes slowly. The tortoise is more likely to win than the hare.

(b) Have empathy for the higher level administrator. Remember, he is standing in front of a bigger fan! Or more fans!

(c) Even if you identify successfully problems which are critical to the institution, there may be very good reasons why nothing is done about them — at least, in the manner in which you would see it done. An administrator cannot take on too many issues at one time. Unfortunately, some administrators want to take on as few as possible.

(4) Attempt to offer alternative solutions or strategies. This is particularly important when dealing with people-problems. Although the alternatives may seem less desirable than the basic solutions, action which goes part way may be better than none.

(5) Look down the road. Attempt to anticipate the turns and the potholes. The important thing is to anticipate and plan for the probable consequences before the decision is made. Next most important — get lead time in order to expand the institution's alternatives.

Finally, remember that the important things will not require a complex Planning-Management System, but they will require both analytical and diplomatic skill.

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THE COMPARABILITY QUESTION: POTENTIAL USES AND MISUSES OF DATA

Adrian H. Harris, University of California, Los Angeles[1]

Higher education has long enjoyed a measure of freedom from external accountability which is envied by those who are outside the system and probably not fully appreciated by those within it. This priviledged position is now being penetrated on all sides by a variety of calls for accountability, usually in terms of specific data by which it is assumed that effectiveness and efficiency of operation can be determined.

The fiscal crisis now facing most public and private educational institutions has not been the sole reason for this cry for accountability, though it has probably had the greatest impact. Students are more aware of what and how they are taught and are often heard calling for greater relevance. Many state legislatures are looking more closely at public higher education in their states in terms of its content and conduct as well as its cost. At least one Governor is calling for faculty to increase teaching loads and the general question of the continuation of the tenure system as we know it today is being more frequently discussed. A major concern of all these groups is improvement of the educational experience through greater student-faculty contact, — smaller classes, more accessibility to distinguished professors — and accomplishment of this at the lowest possible cost.

The common approach to the analysis and resolution of these issues has been to require more and more data by which complex systems can be quantified, summarized, and compared. This is understandable at a time when the consumer is increasingly concerned with getting the greatest value for his dollar. What is not fully understood is the extent to which such data, if not compiled and analyzed with the greatest care, can lead to totally inaccurate or inappropriate conclusions.

The purpose of this paper is to discuss, through actual examples, the difficulties encountered when attempting to make routine comparisons of data and to suggest how data comparison can be handled meaningfully. In so doing, I will also point out how such data can be potentially misunderstood and misused. It is not my intent to discount in any way the need for accountability itself. It is entirely appropriate that higher education should be accountable, albeit in different ways, both to those who benefit from its services and to those who finance its operations. There is also no question but that we will all benefit from such an effort, provided that it is conducted in a responsible, informed, and conscientious fashion.

The National Center for Higher Education Management Systems (NCHEMS) has now appeared on the scene to lead the field in the development of products intended to aid in the reporting process. Unfortunately, there is a temptation to use the results of these efforts as ends to themselves. Such a cookbook approach can more often lead to inappropriate conclusions than to informed judgments. This is particularly true when the result is a single number, such as a unit cost figure, which once obtained can be easily misused unless there is a full understanding of what is being presented and how it can and should be used.

Among the products developed by NCHEMS[2] are the Program Classification Structure which allows institutions to divide their programs into standard disciplinary units; cost finding principles which attempt to set standards for the determination of unit costs; RRPM (Resource Requirement Prediction Model) which has been mistakenly assumed by some people to be a model to develop unit costs for comparative purposes — instead of its real mission as an institutional planning model for internal use; and the Information Exchange Procedures project which is designed to attack the problem defined in its title. Such models are valuable to an institution's internal management, decision making, and evaluation. The danger is in assuming that such techniques can produce readily comparable results when applied to different institutions.

Problems

Thus far I have dealt with the question of data comparability in a general sense. I would now like to offer some specific examples of the problems involved in the selection, definition, and analysis of data to be exchanged or compared. The examples are primarily drawn from the experience of a six-campus data exhange effort in which I was involved for over a two-year period. The six campuses were all large state-supported institutions having broadly based programs of undergraduate and graduate instruction and research. In pursuing the initial goal of data exchange, we uncovered many unforeseen problems.

The first difficulties in data exchange are defini-

tional. In our own effort we spent countless hours on the task of understanding the individual use of terms and then trying to produce meaningful decision rules on the classification of data.

A commonly used data element is the full-time equivalent student (student FTE). In our group, all institutions but one determined undergraduate student FTE by dividing student credit hours by 15; the other used a divisor of 15.5. Of course, greater variation will occur between institutions which have different requirements for graduation or different definitions of "normal progress." At the graduate level the problem of student FTE is vastly more complicated because of the differences in graduate programs and the manner in which graduate education is conducted and credited. For example, one institution in our exchange did not attach any credit value to doctoral work. As a result of these problems, we finally agreed to let each institution use its own method of calculating student FTE and to accompany data with a chart defining the method used. Obviously, anyone using these data must fully familiarize himself with these definitions and understand their differences before drawing conclusions.

A related problem is the need to determine whether student FTE should be aggregated by student level or by course level. Within our group, there was considerable disagreement on this matter. Some felt that course level is the significant determinent of workload; others felt that higher level students create more workload for faculty regardless of the level of course being taken. An added problem was the fact that one campus did not identify course level and thus could not provide data in this form. In either case the choice can have significant effects on data, particularly when micro programs are being compared, and thus the use to which the data is to be put must be considered in reaching a decision.

Another definitional problem centered around the differences in University calendars and the time period for which data are to be exchanged. Among our six-campus group it was found that some used a quarter system, both with and without a summer quarter; some used a semester system; and one used a trimester system covering the full year. Because of these differences, we agreed to exclude summer enrollments from the academic year. Annual data must also be defined as covering either a fiscal year, academic year, or calendar year. While student information is usually easily separated by academic years, financial information cannot always be treated in this way. For example, the campus mentioned above which used a year-round trimester system encountered enormous difficulties in attmpting to exclude its summer component to make its "annual" data comparable with the other institutions.

The results of our deliberations over these and a myriad of other problems of the same nature were represented in twelve pages of definitions covering the data elements to be exchanged and spelling out institutional differences in detail. The complexity of meaningful data exchange is well illustrated by this document, which may be obtained by writing to me.

By comparison, the second edition of NCHEMS' *Data Element Dictionary: Student* devotes 125 pages to 73 data elements; their comments give little idea of the problems we encountered and, of course, this is only one of five such dictionaries.

Selecting Comparable Departments

Our next step in the exchange of data was identification of a series of academic units for comparison. Our initial intention was to select departments that were as nearly identical on all six campuses as possible, recognizing at the outset that programmatic differences may create difficulties in interpreting the data. Thus it was understood that, while most universities are organized into schools, colleges, and departments, not every field is represented at every institution. Furthermore, disciplines, departments or programs having the same name may not include the same subject matter. This is an important problem which is not readily apparent to the outside user of data. It is obvious that physics and English are different; it is not so obvious that two departments called "English" may vary on different campuses. In our own group it was found that some English departments included rhetoric and/or speech and some did not; thus English was rejected for comparison. Similarly, romance languages could not be used because in some cases French was included and in others it was not. At UCLA, for certain historical reasons, our Department of Linguistics includes instruction in several exotic languages not covered elsewhere. Some campuses identify a separte Department of Computer Sciences; at UCLA, instruction in computer sciences is included within engineering and cannot be separated. On the other hand, the same program may be called by different names at different institutions; environmental science on one campus might be ecology on another. There may also be differences between the way graduate and undergraduate programs are organized in some fields. After sifting through the known differences of this kind we were only able to select seven departments for inclusion in the initial data exchange. Later, when analysis of the data uncovered differences even among these departments, it was agreed to provide departmental profiles outlining the program and requirements for each. It was evident that even with careful preliminary screening for similarity, these seven departments also displayed a mixture of objectives, resources, and organization as they were represented on the various campuses.

As we continued our efforts, it became increasingly clear that meaningful data exchange required a full understanding of programmatic elements. Not only was it

necessary to understand the individual programs being compared, but the institution within which they were set and the entire system of higher education as well. Institutional priorities, and commitments, outside pressures for change, and even national interests may all have an impact which is reflected in the data for a particular program at a particular point in time. The individuals involved in this effort were all high-level administrators in their respective universities involved in institutional research and planning. In spite of this, we often found that further investigation was needed to supplement our knowledge of programmatic and organizational differences. Imagine, then, the difficulties that would be encountered by even the most conscientous outsider attempting to analyze our data.

Results

The final step in this initial effort at data exchange was comparison and analysis of the results. Many of the differences which were observed were explained by closer examination of the programs being compared. Only a few of the many possible examples will be discussed here.

One measure compared was an unweighted student/faculty ratio. In the case of one department, the six institutions reported values of 11, 15, 15, 16, 17 and 34. Investigation of the differences here showed that the 34 was the result of misinterpretation of definitions, an occurance for which one must always allow. On the other hand, the small number was associated with a new program; a new program might easily be expected to have a smaller student/faculty ratio due to pre-staffing, in order to cover the field, before enrollments have reached their peak.

The student/faculty ratios in art departments were relatively consistant for all institutions except one, which had half the ratio of the others. In this case the department showing the lower value placed a relatively greater emphasis on art practice than on art history. Thus, classes were required to be taught in small studio sections and more faculty were needed to staff them. This also had the effect of reducing the budgeted support per faculty member to less than half the level observed in the other art departments. A somewhat higher student/faculty ratio at another institution, resulted from the high service load associated with a "general undergraduate art requirement."

In some cases, a department showed a high number of graduate students per senior faculty. While on the surface this appeared to be a commendable use of resources, it apparently resulted from the production of very few doctorates over a number of years. If the present group of students received their degrees within a short period of time, the data would be sharply reversed.

Similar situations occurred when support funds per budgeted faculty were compared. For physics, the results were especially interesting; the six campuses reported the following figures for this department: $12,000, $10,000, $5,000, $3,000, $14,000, and $11,000. The two campuses having extremely low levels of support per budgeted faculty in this case were associated with large extramurally funded programs. On the other hand, the campus reporting $10,000 per budgeted faculty was also known to have a large extramural program including a well-equipped radiation laboratory, yet it did not show the low support figure that might have been expected. Our examination also showed that this institution's program was ranked first among all physics departments in the country.

At one institution the support level in law was forty percent above the others. In this case the departmental budget included provision for a law library; at the other institutions this was part of a separte library budget.

Psychology departments having a strong clinical emphasis characteristically had support levels as much as twice as high as those emphasizing the social sciences. Here four of the campuses reported support per budgeted faculty at $4,000; the other two reported $7,000 and $8,000. In the first case of higher support the department characterized itself as "having more of a laboratory science than social science emphasis." The other was stated to be "associated with a large clinical program." In both cases, the higher figures were easily explained by the costs associated with the support of laboratories and special facilities, a reflection of programmatic differences.

Programmatic differences can affect data even when programs are aggregated by discipline. Another example compares disciplinary groups on two campuses of the same university. For the biological sciences on one campus the support per FTE faculty was recently reported as $16,000 at the other it was $12,000; however, the second campus includes a vigorous health science program which is budgeted separately. In the same report the physical sciences on the first campus showed a support figure of $13,000, compared with $17,000 at the second. Here, the first campus benefited from a large externally-funded research facility.

Implications

The examples could go on indefinitely; the implications, however, are clear. While many legitimate differences will be observed when data are compared among institutions, many other differences are created by conditions not directly related to the data element being compared. This was recognized by the RRPM-1 Task Force of WICHE when they stated in a resolution published on March 9, 1971:

> Institutions of higher education differ widely among themselves. They have different approaches to teaching, different degrees, different requirements for the same degree, different course mixes within a single institution to satisfy the requirements for the same degree, different course

> contents, different methods of awarding and computing credit hours, different support activities, different student/faculty ratios, different goals, and other differences too numerous to enumerate.[6]

An understanding of these differences, and consequently any meaningful comparison of data, can only be accomplished by persons intimately acquainted with the data collection procedures, the programs, the budgeting patterns, the organization, the objectives, and other important characteristics of the institutions involved.

One might think that the most meaningful comparison of data would be made in an unchanged environment at a single institution where various measures are compared for the same units over a period of time. However, such conditions never exist. Even in the least dynamic setting, change occurs and one cannot draw simple conclusions collected over time. On the other hand, given an understanding of the system and of the significance of differences between units and of changes which may be occuring, data comparison can be an important decision making tool for an institution. Inter-institutional comparisons are vastly more complicated, and must be undertaken only with the greatest understanding and care.

Universities will continue to be faced with a multitude of requests for cost analyses and other data. So long as resources for higher education remain scarce, those responsible for their allocation will continue to look for information to help them with their difficult decisions. It is likely that institutions will also be required to demonstrate that they are using their resources in the most efficient and effective manner possible.

Unfortunately, many people feel more secure when their decisions are based on quantitative rather than qualitative information. However, where higher education is concerned, considerations of quality are (or should be) of great importance. While qualitative considerations are usually understood to imply judgments that are more subjective than objective, there is no reason for them to be uninformed or capricious. In addition, it must also be recognized that even when the end result is a number, an essentially subjective decision may have been made in the selection of the method for producing that number. Numbers are not magic. They do not tell the whole story any more than a picture of one side of the moon shows what is on the other side. Numbers can, however, be useful; if they are properly understood and interpreted they can be combined with other information to give a reasonably complete picture.

We cannot escape the fact that data will be collected and comparisons will be made. What we must seek to avoid is standardization and regimentation around formats and definitions designed by those far removed from the system in an attempt to assure "comparable data." Ultimately, we will have to live with resource allocations and other decisions that may be based on such efforts. However, it is essential that higher education not be reduced to the least common denominator.

We have found from practical experience that a number of conditions are absolutely essential to any meaningful exchange or comparison of data in higher education. At the outset, the effort must be designed and undertaken with the full participation of knowledgeable individuals representing all parties involved. Sufficient particulars must be provided to allow rational accomplishment of the task. Specifically, they must seek to:

- Fully agree to the purpose of the comparison and the use of which the data will be put;
- Insure that the data to be collected are consistent with the expressed purpose;
- Define all terms explicitly and include detailed definitions with any data disseminated;
- Provide profiles of each program to be compared, including information on all aspects of program which may affect the data; and
- Permit the providers of the data to review the results so that errors of fact or interpretation may be avoided.

Obviously, this is an ideal and not every condition can be met in every case even when undertaken with the best of intentions. Hopefully, a better understanding of the problems and concerns discussed here will help to establish a meaningful environment in which those involved in higher education and those to whom they are accountable can work together responsibly and responsively.

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[1] Acknowledgment is due Miss Dee Cuenod, Miss Gertie Ewing, Mrs. Jeffrey Gilbert, Dr. Wayne Smith, Miss Corrine Verhulst (members of the UCLA Planning Office staff) and other members of our data exchange group for significant contributions which lead to the production of this paper.

[2] Publications describing each of these items are available from the National Center for Higher Education Management Systems at WICHE, P.O. Drawer P, Boulder, Colorado 80302.

[3] The other data element dictionaries are for course, facilities, finance, and staff.

[4] Kenneth D. Roose and Charles J. Andersen, *A Rating of Graduate Programs*, American Council on Education, 1970. This institution was ranked first for Quality of Graduate Faculty and fifth for Effectiveness of Doctoral Program and in each case ranked higher than any of the other programs compared.

[5] Derived from 1972-73 University of California Budget.

[6] Appendix A of "Report of RRPM Implementation at UCLA," UCLA Planning Office, September 1971.

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AN INFORMATION BASE FOR BLACK HIGHER EDUCATION

James Welch, Institute for Services to Education

Institutions categorized by the U.S. Office of Education as developing, by the mass media as Black colleges, and by themselves as historically Black colleges and universities, have for many years carried out an extremely valuable societal funtion. This function is the education of the Black youth of America. Such a function was the assignment of a young American educational society not quite certain of its destiny and unsure of its place in world history. Consistent with the impetuousness of youth, the conclusion which this young American educational society drew — as it related to the education of its Black population — was that Blacks required a separate educational experience. Thus, the evolution of the historically Black colleges and universities.

Historical records, most of which are buried in state, federal, and some college archives, reveal much of the progress of these institutions. In recent years, however, a significant effort has been launched by the presidents of some 113 of these institutions in the establishment of a data bank to contain facts and figures on their institutions. It was their wish that such a data bank, once constructed, would not merely function as a repository of historical data on themselves, but also as: (1) a model for individual institutions to utilize in fashioning an institutional research data base and (2) a central data source for educational historians and researchers studying the historically Black colleges and universities. The effort referenced is the Technical Assistance Consortium to Improve College Services (TACTICS), and an agency called the Management Information Systems Directorate (MIS) of the Institute for Services to Education, Inc. (ISE) in Washington, D.C. Funding for the MIS directorate of ISE was provided by the U.S. Office of Education. Generally stated, TACTICS is to provide the historically Black colleges and universities with a range of technical services which historically have not been within their *individual* financial ranges. Training in both workshop and seminar form are available in the areas of Admissions, Financial Aid, Recruitment, Cooperative Academic and Administrative Planning, Media Technology, and Information Systems. The MIS directorate was assigned the responsibility of developing a data bank of some specificity and long-range usefulness which shall provide the participating TACTICS institutions with the capabilities cited above. The statements which follow shall put forth what MIS/ISE construed as being *implicit* in this assignment, and what to date, has been developed as a result of such an assignment. The relevance of this development to the topic, "An Information Base for Black Higher Education," should become apparent as the discussion of these developments unfolds.

MIS/ISE Developed Information System

MIS/ISE drawing on its staffs' experience, the experience of the executive and senior program associates of the company, advisory groups consisting of college presidents, technical personnel, and senior administrators and faculty from both within and outside of the TACTICS institutions, designed and developed data base approach which in their collective judgment would be initially useful for a college's institutional research.

It was in the collective opinion of the various advisories that the educational / administrative environment of a developing college or university would require, initially, a set of data elements, which, when properly massaged and interpreted, would yeild as accurate a description as possible of an institution's internal status. These data elements, to yield such a description, should, therefore, encompass the following institutional environments:

- Students
- Faculty and Staff
- Financial (Income & Expenditure)
- Physical Facilities
- Course/Program
- Institutional Characteristics

MIS, with the concurrence of the various advisory groups, recognized that there would be three basic problems in collecting data of this nature:

A. Though many of the terms in higher education were familiar to persons in institutions of higher education, *consistent* definitions of these terms were not available.

B. Collecting data of such depth and detail from institutions which are unaccustomed and/or not presently staffed to provide same, would require in most instances, major procedural and/or policy alterations on

the part of the institution(s).

C. Initiating and implementing an IR office for institutions, the largest percent of which have no electronic data processing (EDP) capability, would require unique staff capabilities on the part of both MIS and the participating institutions.

These three basic problems were approached and solutions sought.

Problems Associated with Data Base Development

A *Data Elements Dictionary* was developed by the directorate along with members of the technical advisory group of MIS. This dictionary provides definitions, descriptions, and examples of some four hundred terms or words esoteric to the field of higher education. The rationale for the development of this dictionary was to assist individuals in the institutions participating in the MIS/ISE program in surpassing the translation problems associated with inconsistent definitions of words, terms, and phrases related to higher education. In almost every case, new words or phrases were *not* invited, but instead, the most frequently applied and existing definitions to educational terms were standardized. The U.S. Office of Education, the American Association of University Professors, and the educational taxonomies in conjunction with USOE's HEGIS (Higher Education General Information Survey) definitions were suggested and utilized. An additional function of the dictionary—with some expansion—would be to function as a basis for the establishment of a "lingua franca" for educational researchers. Three dictionaries were mailed to each of the 113 TACTICS institutions participating in the MIS program during its first year of operation. The dictionary approach, therefore, appeared to satisfy the first basic problem of inconsistency in educational terminology.

Problems associated with the collection of detailed data *on* and *in* developing institutions were approached in two ways. First, agencies which historically have queried developing institutions were identified, and with the unanimous support of the presidents and chancellors of the TACTICS institutions were authorized to release all pertinent data related to their institutions, to MIS/ISE. Once this data was collected and analyzed, it was determined that its content was inadequate to form the appropriate basis upon which could be constructed an IR function. Questionaires were, therefore, designed and developed to supplement the collected data and were mailed to the various colleges and universities. The two design requisites for these questionaires, bearing in mind the problem of the institution not being geared to respond in any great amount of detail, was to: (1) develop a survey instrument which would be useful to the responding institution as a research profile of itself; and (2) provide an instrument which, when completely filled out, could be utilized as a guide for responding to questions on other surveys.

An additional problem associated with data collection was revealed through the analysis of the agency-collected data. Inconsistency in defintion of terminology from one year to the next was the most prominent problem. The most consistent base was data gleaned from the HEGIS (Higher Education General Information Survey) reports administered by USOE/National Center for Educational Statistics. MIS, together with its advisors, determined that the most lucid data base could be formed by coupling the HEGIS data with data collected through the separately administered MIS/ISE survey instruments. *The MIS/ISE data bank, therefore, contains data pertinent to the areas outlined earlier in this section on 113 developing institutions dating from the present (Spring, 1973) back to Fall of 1965.*

It is, with this base providing the input, that MIS/ISE has developed an On-Line QUERY computer system useful to institutions desirous of implementing an automated information base for institutional research and management information purposes.

The Evolution of a System

In the opinion of the MIS directorate, it is inconceivable to believe that just because a set of procedures has been developed which may improve an institution's research operation, that that institution is *able* to perform all of the required policy and procedural alterations necessary to accommodate it. To have, therefore, a system available to colleges desirous of implementing an automated IR, tailored to their individual needs, and one which could more closely conform to a developing institution's economic resources, was the undergirding approach to the solution of the third basic problem conceptualized by the directorate — initiating and implementing an IR office for institutions, the largest percent of which have no electronic data processing.

As of January 31, 1972, there were operative 42 computer configurations in 36 of the 113 TACTICS institutions. This statistic indicates that about 70% of the institutions participating in TACTICS had no computer capability. To develop an automated system for IR purposes in view of such facts required additional consideration. Such considerations included: (1) the overall IR and information management objectives of the various institutions; (2) the operating budget of the institution's IR office; and (3) the institutions aggregate staff capability. Based on these fundamental considerations, the remote-access, computer time-shared approach was construed as being the most appropriate for the largest cross-section of the TACTICS institutions. Given this decision, a model system was developed and is now operative for use in the MIS Washington, D.C. office. The model system is presently referred to as QUERY.

The design and documented procedures which an institution may follow for the establishment of an insti-

tutionally-based QUERY System approach, therefore, assumes access to a computer facility via some remote access device — teletype or console keyboard. Some advantages of an automated system I think would be in order here because non-technical people often concatenate computers with magic. The principal advantages of the system being automated are: (1) a large data base could be maintained; (2) the manipulation of the base would not require as many man hours as it would if it were manually massaged nor would the number and kinds of manipulations be restrained due to their complexity; and (3) the construction and testing of various *educationally valid* economic models would not be restrained either by time or complexity of models due to a proliferation of variables. In each instance, one quickly notices that the advantages of the automated over a manual system is the amount of time conserved and the elimination of human error due to the redundancy in the data manipulations. Whether an institution requires repetitive data manipulations or time conservation should be entirely their decision. Thus, the system being developed by MIS shall be available for those institutions requesting it.

You should be asking yourselves, "How do these developments contribute to the subject, "An Information Base for Black Higher Education?" My response is this:

First, The development of the Education Data Elements Dictionary provides educators as well as researchers with a basic definitive reference for educational terms and phrases.

Second. The design and development of a survey, which if properly understood by the institution, would function as an institutional profile report *internally* and as an *external* report on the institution to MIS. Such a document is presently being utilized as input into a data base for the TACTICS colleges and universities.

Third. The collection of agency data (i.e., ISE, Higher Education General Information Survey, etc.) adds another historical dimension to the information on the TACTICS institutions which should be extremely interesting when paralled with data gleaned directly from the colleges.

Fourth. Given the volume of analysis necessary to interpret the collected data, the QUERY system was designed as a data organization and retrieval system which would enable a researcher to get to the data required for the generation of institutionally useful reports. Such reports would be productive in assisting institutions to plot their progress over any particular time period.

In Summary

You should now begin to see how these developments fit together. Seven years of data on 113 institutions is in one location. A system is being developed so that a researcher does not necessarily have to be in that location to retrieve specific kinds of information. The files in the system shall be so structured that if one institution wishes to develop such a system for itself it may use the developed system as a model, or if a group of institutions would want to create an IR network, a system would be available.

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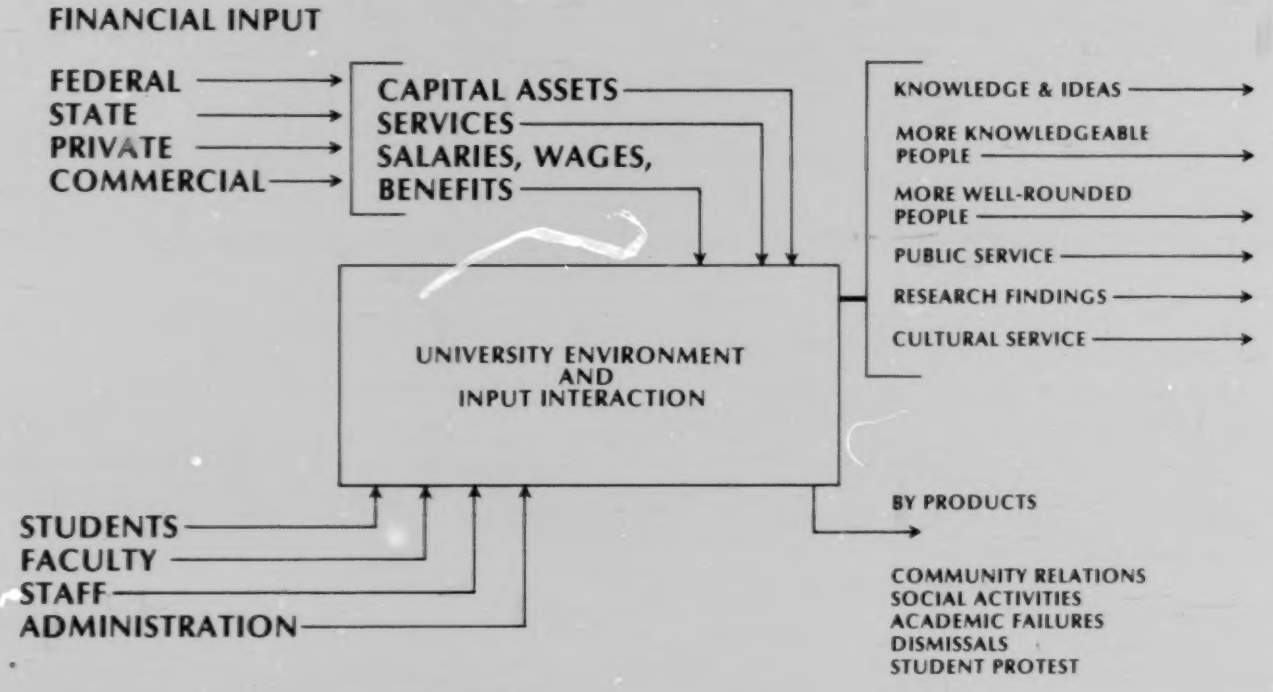
FINANCING UNDER CONDITIONS OF DECLINING FLEXIBILITY

James R. Montgomery, John Janney, Gerald W. McLaughlin, and David Sieg, Virginia Polytechnic Institute

When an institution becomes aware that disparity exists between its financial expenditures and resources, it must, if it is to remain viable, make preparations for functioning in the midst of such imbalances while simultaneously initiating programs designed to rectify the situation. It is just such a situation in which increasing numbers of institutions of higher education now find themselves. There are, furthermore, strong indications that this trend will continue for the foreseeable future.

As an aid to discussion of this problem, a simplified system diagram is presented below. Included are the primary concepts involved. The problems facing adminis-

Figure 1
SYSTEM DIAGRAM FOR HIGHER EDUCATION



trators in higher education are perhaps best treated in terms of three distinguishable, if overlapping, areas of concern: financial limitations, enrollments, and social responsibility. With respect to the first consideration, there is little argument that institutions of higher education, both public and private, have simultaneously been confronted by spiraling costs and restricted funding. For publicly controlled institutions in the United States, the current expenditures per full-time-equivalent student (in terms of constant dollars for 1969-70) increased from $1456 in 1959-60 to $1896 in 1969-70.[1] This increase, after correction for inflation during the decade, strongly supports the claims of administrators that costs have mushroomed.

Sellers' Market

The decade of the 60's saw a sellers market for college faculty and staff which was largely the product of sharp enrollment increases and heavy spending on research. In addition, while opening fall enrollment for all students in all institutions of higher education more than doubled over the decade, other factors including inflation, rising faculty salaries, increased expenditures for student aid, theft, and destruction continued to boost costs.[2,3]

A comparison of the large universities of the seventies with institutions of twenty-five to thirty years ago indicates faculty spend fewer contact hours in teaching — at times larger classes compensated for this reduction in students taught, at times no adjustments were made. Another trend has been a greater emphasis upon providing opportunities for disadvantaged students. As greater numbers of such individuals are enrolled, the average per-student costs tend to rise because of the larger expenses involved.[4] An equally important factor contributing to cost increases has been the growing emphasis upon advanced degree programs.[5,6] On the average, the preparation of an advanced degree holder necessitates greater commitment of resources per student than do expenses associated with the bachelor-level degree. Another and continuing trend has been the acquisition of increasingly complex and expensive equipment, particularly in research-oriented fields. Such needs are a direct function of the knowledge explosion which has necessitated more sophisticated means of data analysis, storage, and retrieval. This trend will level off only in the undesirable event that institutions of higher education, by failing to maintain modern facilities, begin to relinquish their position in the forefront of the knowledge explosion.

In order to complete the picture regarding financial limitations, factors associated with ever-rising costs must be considered in conjunction with the slowing or stabilizing levels of financial support which many institutions are currently experiencing. Both commercial and private contributions continue to be affected by recent recession as the following excerpts indicate:

> Total corporate giving to education in 1970 declined 9.38 percent to $340 million. About 80 percent, or $270 million went to higher education.[7]
>
> In its most recent report on private gifts to U.S. colleges and universities, the Council for Financial Aid to Education found that last year (1970) the first average annual decrease in more than a decade was registered.[8]

While a modest increase (6.5 percent) in total giving to higher education occurred in 1971, the message is clear. Philanthropic contributions to higher education were becoming more difficult to obtain.[9]

At the same time, governmental support at both the federal and state levels has become more tenuous as the voting public, in part because of recent campus disorders,[10] demands a closer accounting for its tax dollars. In addition, one body of thought contends that state governments have reached or are approaching the limits of their capacities to support higher education, particularly in view of pressing and ever more competitive demands for slices of the tax dollar.[11]

The extent and severity of the financial crisis may best be demonstrated by an illustrative example. The National Association of State Universities and Land Grant Colleges (NASULGC) recently stated that 14 of its members had reported operating fund deficits for the 1969-70 academic year.[12] They further reported that 44 members had reported increases in their operating budgets of 10 percent or less, while a 10 percent increase was determined to be the minimum average requirement for matching the effects of inflation and enrollment expansion.[13]

Nor is this situation restricted to the university levels. A recent study has disclosed that many smaller, private colleges were showing operating deficits by 1969 (1968-69) equal to 26 percent of the book value of their assets.[14] In a follow-up study, the author predicted the failure of as many as 100 of the institutions in the near future, given "business as usual."[15]

Another survey of 48 private four-year liberal arts colleges revealed that most were characterized by worsening financial conditions with no help in sight.[16] The researchers felt that colleges have experienced more inflation than the economy as a whole while producing only slightly more growth.

In many instances where colleges and universities have continued to operate in the black, methods for sustaining financial solvency have included tuition increases and boosted rates of admission rather than actual management improvement.[17] There are strong indications that such approaches, wherein the student is asked to pay for disparities between productivity and cost, are nearing ex-

haustion.[18] Another factor which must now be faced results from the declining birth rate between 1957 and 1968.[19] Projections indicate that the college-age population (18-24 year olds) will actually decline between 1980 and 1985.[20] Furthermore, enrollments may be expected to slow, where they have not already done so, at a much earlier date.[21] In the fall of 1972, for example, the percentage of high school seniors entering higher education, which had been rising for decades, actually declined. The prospects of actual declines in enrollments present a problem with which educational institutions have rarely had to deal. With the exception of enrollment declines which resulted from the graduation of veterans (about 1950-52) and declines attributed to enlistment in World Wars, enrollment pressures have mounted continuously throughout the century. If projected decreases to occur, and if capital investment expansions continue at present rates, one should not be surprised to see many institutions developing over-capacities at least in certain types of facilities by the 1980's. Studies show the small institutions are in many instances already feeling the pinch for students. A survey of 431 private colleges for the period 1965-1972 indicated that even during this period of generally increasing enrollments, these smaller schools showed declines in percentage increase.[22]

In terms of cost it might be expected that fixed costs will be maintained at current levels while variable costs will be proportional to facility utilization. It will be the rare institutions which can reduce and control fixed costs at rates commensurate with inpending enrollment declines.

Break-even Analysis

A simplified break-even analysis such as that presented in Figure 2 represents the fixed costs (FC), variable costs (VC), and total revenue (TR) lines. If one assumes the difficulties involved in reducing fixed costs rapidly in the face of enrollment declines and that given any level of inflation variable costs will not be reducible without damage to educational quality, the question for each institution is whether its enrollment will decline below point E. Point E designates the "break-even" point between profits and losses.

The third question which should be considered relates to the social responsibilities inherent in the role of higher education. While social responsibility assumes multi-faceted dimensions, this question asks to what degree an institution should monitor and align itself with demands for the specific degrees which it supplies. An institution which does minitor such demands for degrees should be able to ascertain what portion of the total market it can supply. Logically each discipline would endeavor to tailor the number of degrees granted to anticipated demands. Problems arise when such procedures are conducted on an informal and non-systematic basis as is the case at some institutions, and from the competitive desire of departments to attract majors. The impending degree surplus in specific areas dictates that such procedures need to be formalized. In instances where a given discipline finds itself glutted with degree candidates designated for surplus areas, even after accounting for the effects of normal attrition and curricular switching, counseling and re-orientation programs become desirable and necessary. Such a concern also has economic implications, for example in faculty staffing and in confidence of students and alumni in the purposes of an institution.

The discussion in this paper thus far has consisted of a review of current and anticipated challenges facing institutions of higher education now and in the not so distant future. The second portion of the paper suggests methods which have been either proposed or implemented in response to the situations outlined. Again it may prove best to separate considerations into three primary areas: cost-cutting procedures; income producing methods; and managerial actions. (Admittedly there is considerable overlap within the three.)

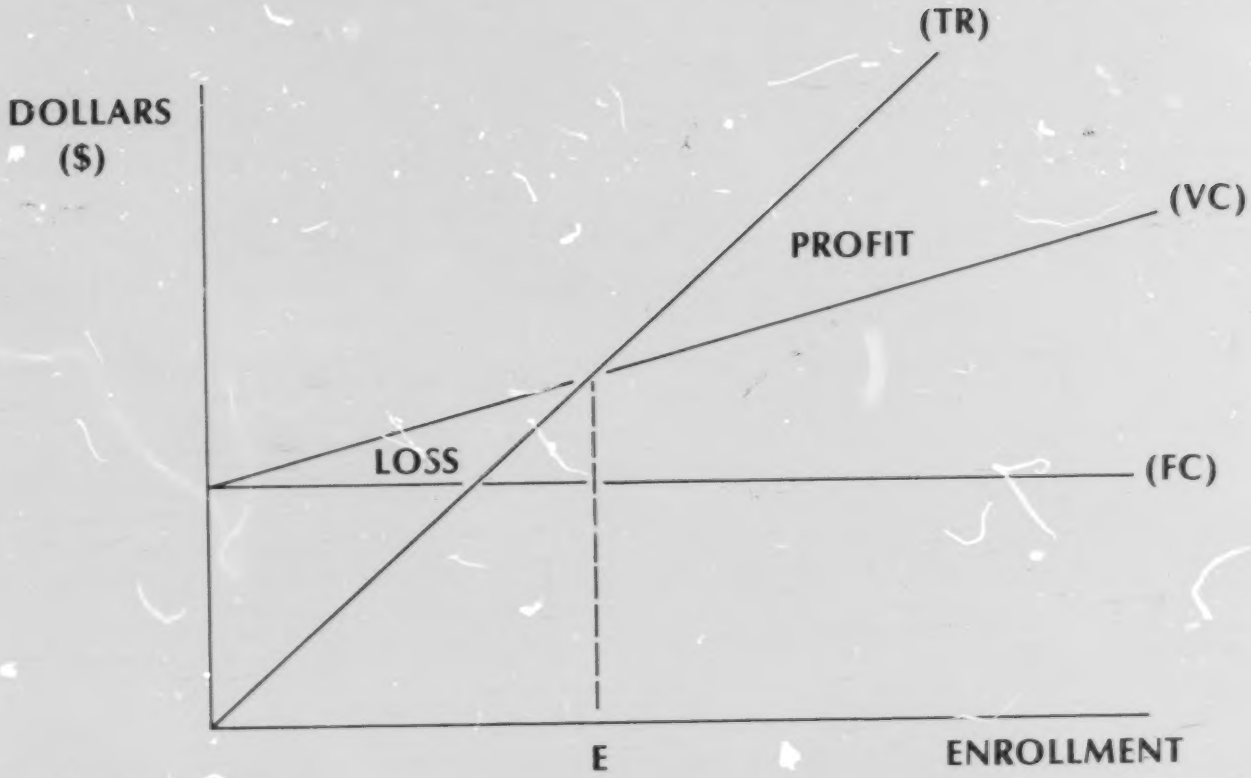
Perhaps the easiest area to subcategorize is cost-cutting. This might then be loosely divided into the following categories: selective cuts, across the board cuts, consolidation, readaption, and the "swim or sink" approach. The National Association of State Universities and Land Grant Colleges has compiled a list of seven economy measures which are employed with varying degrees of frequency by member institutions.[23] Of these seven measures, deferment of maintenance, elimination of new programs, and faculty-staff cutbacks or freezes were found to be most frequently employed. Some of these involve stop-gap methods which can only erode the overall educational quality of the school in the long run.[24]

The Academy for Educational Development, Inc. has compiled a list of some three hundred and nineteen specific actions and approaches aimed at alleviating financial difficulties.[25] The list deals not only with cost-cutting methods but additionally cites several infrequently explored alternatives in the area of income production some of which will be mentioned below.

One method of cost-reduction receiving much attention is to combine small, related departments. Such an approach, it may be argued, eliminates needless dual costs and administrative replication. A more stringent approach also receiving attention is the painful but realistic elimination of departments which have ceased to grow and have actually shrunk in recent years.

Consortia represent another concept receiving increased scrutiny.[26] Cost reductions can and do occur when contiguous colleges form alliances in offering courses, facilities, and services. Successful cooperative arrangements currently functioning in Washington, D.C., New Hampshire, Boston, and other areas attest to the benefits of

Figure 2
BREAK-EVEN DIAGRAM



consortia.

A related method which has long occupied a controversial position among faculty and administration alike manipulates so-called productivity ratios, such as that between student credit hours produced and full time equivalent faculty.[27] Large lecture sections almost universally are coming into more frequent use. "Work-study" or "special" study course offerings which allow for independent student research are also felt to hold answers. The primary villain is felt to be indiscriminate course proliferation.

While tuition increases and the assessment of various fees remain valid and realistic practices, revenue from them should not be viewed as an area of major thrust in the quest for balanced budgets. There remain realistic upward limits to higher tuition, especially in an era when the open door to education promises to become a reality. The expectation of higher income through enrollment increases is warranted only in instances where admissions and recruitment programs have been revitalized and coordinated in recognition of the keen and growing competition. Since the problem of boosting income sources may be expected to become even harder to solve, alternatives must be sought. Certainly large additions from federal and state governments should not be expected.[28]

One method of fund acquisition which has received much attention calls for investments which involve higher than traditional risks but which also promise greater returns.[29] One contributor to Jellema's *Efficient College Management* listed among a college's diverse portfolio of investments federal housing projects, private subdivisions, motels, laundromats, and even a harness racing track. The

same author refers to the "small town banker approach" which seems to characterize the views of many directors of finance and boards of trustees.[10] Another plan, the so-called Yale Tuition Postponement Plan, permits students to delay payment of portions of yearly tuition in return for a percentage of future income over a specified period. A recent item in ERIC echoes the familiar but true refrain that alumni remain a largely untapped source of funds. The author of it further asserts that trustees might attempt to shoulder more of the responsibility in the area of fund acquisition.[11]

Efficient Management

Efficient management, the third area for review, offers the promise of both the greatest frustration as well as the best hope for survival. Realism dictates that educational institutions anticipate an extended period of financial stringency. While funds in many instances may stabilize, one cannot expect demands upon them to do likewise. Accordingly, one must strive to do more, or at least as much, with less. A most fundamental change is needed in the concept of educational management. Whether one likes it or not, it appears that continued financial solvency will necessitate adoption of approaches analogous to methods employed by modern commercial management. As much as one may eschew concepts such as product deletion, for example, this perspective is precisely what lies behind current emphasis upon priorities. Modern management techniques and methods should leave no area untouched by introspection and analysis. Three primary areas with which management should concern itself have been outlined by one author as follows: (1) careful analysis of the relationship between the utilization of resources and the accomplishment of goals; (2) quest for maximum economies with minimum sacrifices in quality of education; (3) encouragement of rapid and flexible adaptation to changes in demands.[12]

The realistic response to point one above clearly invalidates use of blanket reductions. Yet, as the following quotation indicates, this procedure is popular.

> Across-the-board cutbacks (for instance, budgets lowered by 5 percent for all departments and schools), or a university-wide "freeze" on hiring or on raises, are the comming pattern. . . . Equity among divisions whose relevance to the university's main mission varies a great deal is the opposite of selective pruning.[13]

If across-the-board cuts are not the answers, priorities need to be established and each program individually evaluated in terms of these. Having done so one can confidently and justifiably reduce costs in less or non-essential areas. (It will not be easy, however.)

The unifying thread to the suggestions which have been offered is the need for management by objective. In a time of stringency such as currently exists, it would be beneficial for each university community to reassess its long-range goals and associated short-range objectives and then to make decisions based upon those objectives. The essential element to each daily decision, such as the cost reduction discussed herein, is the evaluation of its effect upon the achievement of long-range goals such that short-range actions do not jeopardize the more pervasive goals.

The process of evaluating and, if need be, curtailing the operations of an academic department in higher education is analogous to the product deletion decision often encountered by commercial enterprises. This approach is reflected in two product decision proposals prepared on the campuses of Connecticut and Minnesota. The essence of each of these proposals is a series of questions with categorical answers which relate a product's compatibility with and position among existing product lines. The questions and their responses combine to form weighted groupings (for example, marketability and channels of distribution) which are evaluated to determine an index value. Levels of degree production and enrollment would enter into the process as crucial variables. Such management techniques do not eliminate subjective decision making altogether, but they do provide a narrowed spectrum over which decisions are to be made while providing uniform sets of criteria.

The Objective

The ultimate objective of this presentation is not to suggest specific techniques which might be employed to optimize utilization of limited resources but rather to call for an overall plan of attack, hopefully before a crisis arises. In light of this objective, two useful planning documents, mentioned above as examples of product decision proposals will be briefly discussed. The first document is one which was presented by the Long Range Financial Planning Committee of the University of Connecticut to its president.[14] The strength of this proposal is that it is oriented toward specific recommendations for improvement in areas which the committee saw as economically deficient. For example, in consideration of income and under the title of internal pricing, the committee recommended to the Student Welfare and Scholastic Standards Committee that a fee for dropping courses after a certain point at the beginning of each term be instituted. Similarly, the committee recommended to the Faculty Standards Committee a series of ratios for use in evaluating fund allocations to departments.

The specific recommendations suggested in the Connecticut document, however, represent only part of the importance of this effort. The importance lies in the fact that *specific* recommendations were made for *specific* bodies or individuals to act upon by a concerned group of faculty and administration.

Another excellent budgeting-planning document has

been developed at the University of Minnesota.[8] The thrust of the Minnesota plan was to design a budget to make 15 percent of the 1971-72 instructional funds available for reallocation within the university over the period of 1972-75. As a part of this planning document, the joint committee effort at Minnesota posed many penetrating questions under broad headings such as Uniqueness of Programs, Vitality of Faculty and Student Body, and Costs of Program. These questions provided areas of concern from the general to the specific within which decisions were to be made and actions undertaken. The areas ranged from the breadth of a consideration of program effectiveness and redundancy to the depth of a concern about hidden costs relative to any particular program or department. Such questions, the core of the Minnesota plan, provide the framework for planning and budgeting at all levels in the institution. The same questions could be employed by any institution of higher education but would be answered differently based upon the goals and objectives of each. The final segment of the Minnesota plan presented actual goals in terms of percentage reallocation of funds for each year over the three-year planning period. For the first year of this three-year period, each budget unit was to reduce its budget by 6 percent. The unit or the college could then make proposals to retain half this amount (3%) for new or renewed programs. The other 5 percent was reserved for use by the total University to support new programs. Herein lies the strength of the plan, for the university began with a problem (financial difficulties), assessed its organizational goals, developed a broad freamework for continual planning, and finally established objectives by which individual actions should be guided and evaluated.

When one compares the two documents previously discussed, the similatities in planning processes become clear. Both planning documents resulted from the realization of a problem and the development of specific actions to remedy it based upon organizational goals. Also, each of the plans presented a unified approach to the organizational problems rather than a piecemeal solution to results of an underlying problem.

In summary, conditions are either present or upon the horizon which may retard financial growth. As indicators emerge which suggest a need to hold or to reduce budgets, the most useful approach appears to be to make a thorough self-analysis as a basic for reorientation and imaginative plans for the future. Limited measures such as deferring maintenance or purchases usually prove ineffective over a period of time. Moreover, cooperation will be needed among the administration, faculty, and students in order to find the best solutions while avoiding to the extent possible loss of morale and effectiveness. Clearly, there will be a need to plan and to manage effectively.

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[1] National Center for Educational Statistics, *Projections of Educational Statistics to 1979-80* (Washington, D.C.: U.S.O.E., 1971), page 3.

[2] Campbell Geeslin, ed., "Total Cost of Higher Education Continues to Rise," *College Management*, Vol. 6, January, 1971, pp. 10-12.

[3] *A Fact Book on Higher Education* (Washington, D.C.: American Council on Education, 1st Issue, 1971), p. 71.20.

[4] Geeslin, "Total Cost of Higher Education Continues to Rise," p. 11.

[5] Proceedings: *A Symposium on Financing Higher Education* (Atlanta: S.R.E.B., June 12, 1969), p. 20.

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[10] *Symposium on Financing Higher Education*, pp. 29, 31.

[11] Hudgins and Phillips, *People's Colleges in Trouble*, p. 1.

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[13] *A Fact Book on Higher Education*, 2nd Issue, p. 71.77.

[14] William Jellema, "The Red and The Black: Special Preliminary Report on the Financial Status, Present and Projected, of Private Institutions of Higher Learning" (Washington, D.C.: Association of American Colleges, 1970) ERIC ED 058837.

[15] William Jellema, "Redder and Much Redder: A Follow up Study to 'The Red and the Black'" (Washington, D.C.: Association of American Colleges, 1971), ERIC ED 058 838.

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[19] *Fact Book on Higher Education*, 2nd Issue, p. 71.69.

[20] *Projections of Educational Statistics*, p. 22.

[21] Hudgins and Phillips, *People's Colleges*, pp. 4-5.

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[23] Editorial Projects for Education, "15-Minute Report," (Washington, D.C.: Vol. 7, May 1, 1971) pp. 1-4.

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[25] "Ways Colleges and Universities Are Meeting the Financial Pinch," Management Division, Academy for Educational Development (New York, New York: April 1971).

[26] David A. Trivett, "Small College Management: Key to Survival" *Research Currents*, ERIC, George Washington University (March 1973).

[27] *Ibid.*

[28] "... *For Your Information,*" *(Washington, D.C.: NASULGC, Office of Research and Information, Circular No. 179, March 2, 1973)*

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UNIVERSITY IMPACT ON LOCAL ECONOMY

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Universities influence their local economies by generating additional gross real goods and services from institutional expenditures and personal expenditures of staff, students and visitors. A simple minimum cost methodology for delimiting the economic impact of a university on its local economy is described and illustrated by The University of Calgary's impact on the City of Calgary for three fiscal years.

Methodology

The methodology includes a calculation of total cash flow into the local economy from four types of university-related expenditures leading to estimates of economic impact defined by local jobs and by earnings directly or indirectly supported by the university. The proposed methodology is structured to take full advantage of the peculiarities of the local economy in order to minimize the cost and time required to use it. Therefore, some judicious adaptation may be necessary when the methodology is applied to different types of local economies.

Staff disposable income, net university expenditures, visitors' expenditures and student expenditures are initial local income as shown in Figure 1.

Local staff expenditures are assumed to equal staff disposable income. Such items as savings and private expenditures outside of the city are assumed to be offset by other income sources. Surveys which would estimate leakages are costly to produce and the net effect of this approximation is judged not to be significant for the purposes of this study.

Net non-salary university expenditures include non-salary operating, non-salary trust fund, and capital expenditures. The value of goods and services purchased by the university which flow in first-round expenditures into the local economy is estimated[1] based upon the assumption that payments to firms flow directly into the local economy in the first-round if the firm has a local mailing address or a local business telephone number.[2]

Expenses of non-local delegates to campus conferences are considered to represent the majority of visitors' expenditures. An estimate of per visitor total local expenditures is applied to the number of annual non-local delegates to campus conferences.

Local expenditures per full-time student are based upon estimates from files of university financial aid offices.[3] It is assumed that full-time students if they are not attending university would be idle resources or would be taking employment opportunities from someone else making the net effect nil. Also, it is assumed that in the absence of the university, students who live at home would have gone elsewhere to study and further that room and board expenditures of students living at home are the same as those for students living away from home.[4] The student expenditure estimate (not including tuition) is multiplied by the number of full-time students.[5]

Expenditure and Income Multipliers

University related expenditures within the region create local income, jobs and business investment opportunities. The first-round income accruing to local residents is partially respent in businesses round after round, becoming an infinite geometric progression creating additional income and employment.

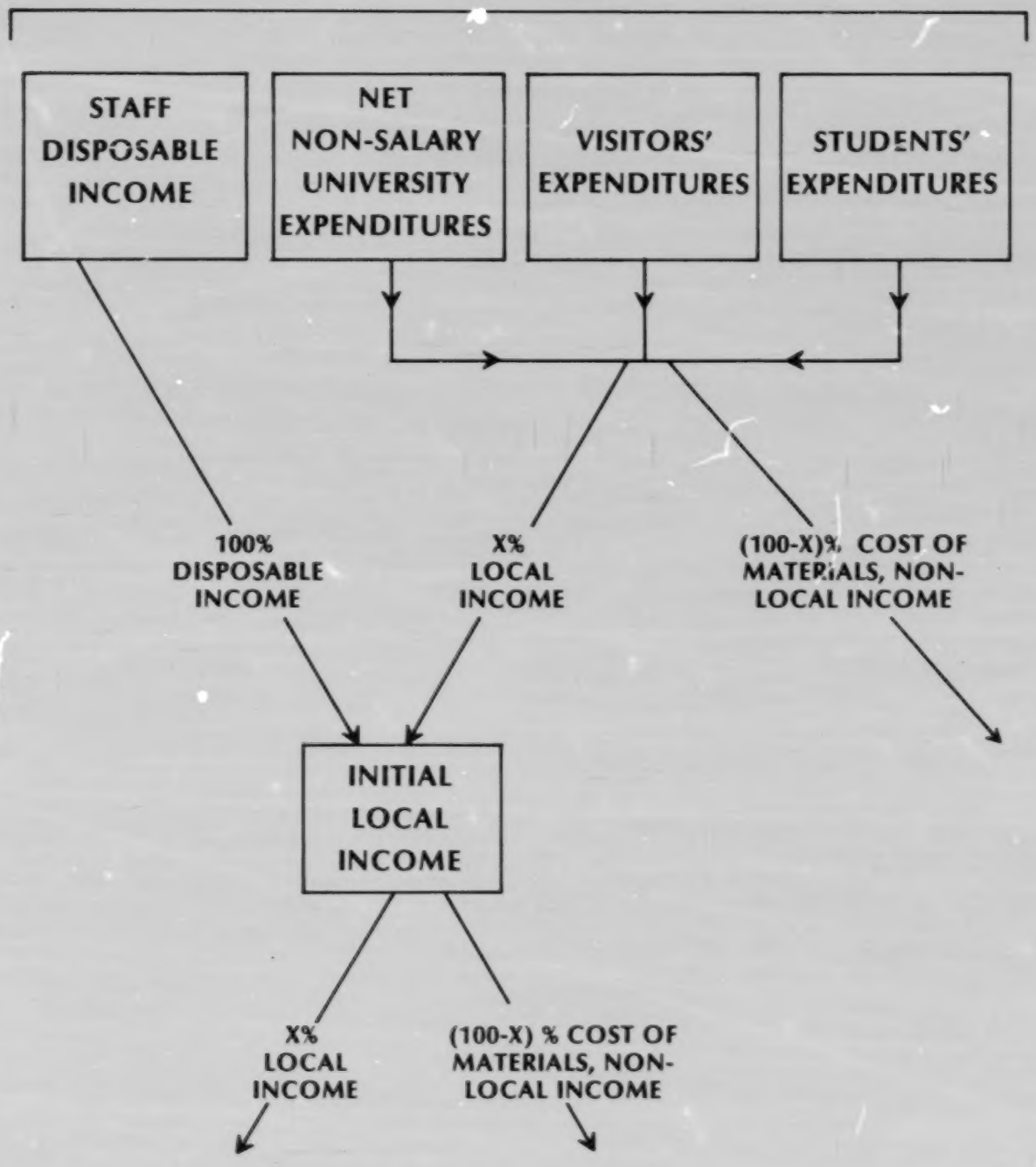
Expenditure income and initial income multipliers are estimated based upon existing studies of various types of expenditures and regions with similar characteristics.[6] Multipliers vary depending upon comparative reliance on imports, spending and saving preferences of residents, patterns of consumer spending, and regional industrial and business structures. Multipliers within the ranges of values determined by relevant studies are chosen as reasonable estimates to multiply by initial income and university related non-salary expenditures within the region.

Employment Opportunities

Universities support many jobs in addition to those on campus. These jobs are an indicator of the economic impact of the institution on the community. An estimate of jobs supported is obtained using the average of results of two methods.

Method I — University employment is assumed to form part of the regional economic base which consists of those activities providing employment and income on which the local economy depends. This theory[7] premises that "nonbasic" jobs are generated through employment of persons in activities which form part of the economic base.

Figure 1
INITIAL UNIVERSITY-RELATED EXPENDITURES



Several estimates of the size of the multiple effect of additional basic employment have been made for various types of expenditures and regions. Employment multipliers within a region are larger the greater its population and employment diversity, and the less its dependence on imports.[8] A value for the employment multiplier may be based upon studies of regions of similar size, diversity and interdependence, and upon studies of similar types of expenditures. This value multiplied by full-time equivalent university employees yields an estimate of additional jobs supported by university wages and salaries.

In addition, the non-salary operating, non-salary trust fund, and capital expenditures of the university support employment. Ratios of the value of construction work and wholesale trade to the number of employees within each industry are applied respectively to university capital and non-salary operating and trust fund expenditures to yield initial employment estimates. Average employment multipliers for contract construction and wholesale trade are estimated based upon studies of similar regions, and are applied respectively to these initial employment figures.

Method II — The number of local jobs attributable to the presence of the university may also be estimated by applying an "employment requirements coefficient." Coefficients measure changes in local employment associated with the average household dollar spent locally when direct and indirect production requirements and induced income effects on local production are taken into account.[9] A suitable range of the coefficient is suggested by Caffrey and Isaacs in terms of man-years of employment per dollar of university-related expenditures in local businesses. A coefficient which is chosen based upon criteria similar to those of the income and employment multipliers is multiplied by staff expenditures and university non-salary operating, non-salary trust fund and capital expenditures.

Mathematical Statement of the Methodology

The methodology is summarized algebraically in Figure 2. Equation 1 shows the calculation for initial business volume while income generated is given by equation 2. The two methods of estimating employment generated are given by equation 3.

Estimating Trend of Future Impact

Assuming that university-related expenditures are proportional to full-time students, and that initial income multipliers in the projection year equal those in the base year, annual local income generated over succeeding years may be estimated based on student projections. This estimate is likely to be low if the local economy is expand-

Figure 2

ALGEBRAIC STATEMENT OF THE METHODOLOGY

Equation 1

$$B = W + h(T + C) + fV + gS - R$$

in which:

- B = initial local business volume
- W = disposable income of faculty and staff less that of faculty on leave
- h = $\frac{\text{local disbursements}}{\text{total disbursements}}$
- T = non-salary operating and non-salary trust fund expenditures
- C = capital expenditures
- f = per visitor estimated local expenditures
- V = number of conference delegates
- g = per full-time student estimated local non-tuition expenditure
- S = full-time students
- R = revenues from university facilities

Equation 2

$$I = \alpha W + \Omega (B - W)$$

in which

- I = local income generated
- α = estimated initial income multipliers
- Ω = estimated expenditure-income multiplier

Equation 3

$$J_I = \lambda (E + mhC + nhT) ; J_{II} = E + p[W + h(T + C)]$$

in which:

- J_I = FTE jobs using Method I
- J_{II} = FTE jobs using Method II
- λ = estimated employment multiplier
- E = FTE faculty and staff employed by university
- m = $\frac{\text{FTE construction employees}}{\text{value of construction work performed}}$
- n = $\frac{\text{FTE wholesale trade employees}}{}$
- p = employment requirements coefficient

ing because values of multipliers in the projection year tend to be higher than those in the base year.

The proportion of local jobs supported in a given year may also be estimated by assuming that the ratio of projected full-time students has a direct relationship to the projected regional employment directly or indirectly supported by the university.[10] An estimate of full-time equivalent employees within the region in the given time period is used to determine the estimated proportion of local jobs supported by the university.

Discussion of Methodology

The economic indicators of local income generated and full-time equivalent jobs created are not the only ones which could be chosen.[11] A balanced picture of the total economic impact of the university on the community must include many dimensions such as expansion of local credit bases, unrealized local business volume due to the university having its own facilities, the proportions and value of capital and property which relate to university-generated business volume, and local government expenditures and revenues due to existence of the university. Each of these factors are important yet require detailed analysis. Their omission limits the results and the significance of their omission must be judged in light of the purpose of each application of the methodology. The proposed methodology attempts to yield evidence of the economic impact of the institution on the local economy to assist the institution in providing an accounting for resources provided by governments. Thus, local income generated and full-time equivalent jobs created seem most relevant for this purpose.

Figure 3 shows the income and jobs generated in the City of Calgary by the University of Calgary in 1966/67, 1970/71 and 1971/72. Thus, as the number of full-time students increased from 4074 to 9173 the local income attributable to the university grew from $21 to 71 million and the number of full-time equivalent jobs resulting from university-related activities jumped from 2850 to 7990.

Needs of people whose income and jobs are supported by the University of Calgary provide substantial marketing opportunities for local retail and service establishments. By assuming that university-generated income will be spent in a manner similar to that of average Canadian families,[12] distribution of local retail activity in food, housing, clothing, automobile, furnishings and other industries can be estimated. Figure 4 shows the distribution of income generaged by 1971/72 University of Calgary related expenditures into these sectors.

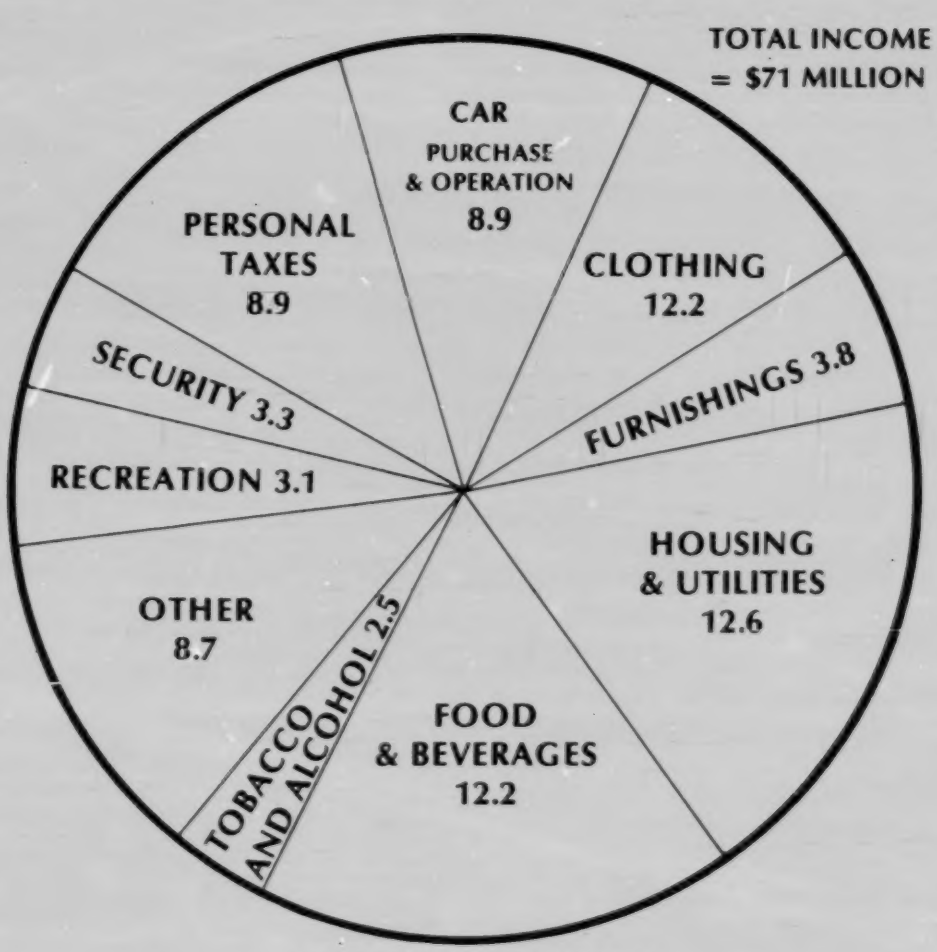
Figure 3

RESULTS

IMPACT OF THE UNIVERSITY OF CALGARY ON THE ECONOMY OF THE CITY OF CALGARY

YEAR	FULL-TIME STUDENTS	GOVERNMENT INVESTMENT ($'000,000)	INITIAL LOCAL BUSINESS VOLUME ($'000,000) (B)	LOCAL INCOME GENERATED ($'000,000) (I)	FTE JOBS (J' + J2)/2	ESTIMATED PERCENT OF CALGARY EMPLOYMENT SUPPORTED
1966/67	4074	23	24	21	2900	3
1970/71	9237	42	59	64	7100	5
1971/72	9173	51	64	71	8000	5

Figure 4
DISTRIBUTION OF LOCAL 1971/72 INCOME
GENERATED BY
UNIVERSITY OF CALGARY RELATED EXPENDITURE



*The authors wish to express their appreciation to Mrs. Margaret Reti, Office of Institutional Research, The University of Calgary, for her contribution in the development of the methodology described in this paper.

[3] This estimate does not include investments, bank transfers, travel expenditures, pensions, fellowships, bursaries, scholarships or student loans.

[4] In order to minimize costs of data preparation, the ratio of local to total university expenditures calculated for one time period may be assumed constant and multiplied by capital, non-salary operating and non-salary trust fund expenses of succeeding time periods to yield estimated local first-round university expenditures.

[5] In the University of Calgary illustration, a questionnaire calculated by the Student Affairs Office to a ten percent sample of full-time students verified the estimates of per student expenditure used.

[6] This last assumption was tested with University of Calgary data to estimate the decrease in total students' expenditure if room and board expenses of students who live at home were not included. Room and board payments less an estimate of the costs to families for those students were deducted. The difference in cash flow into the local economy was approximately three percent. Therefore, the extent of economic impact was not significantly changed.

[7] University housing, food services centres and bookstore revenues are subtracted from the total cash flow because gross expenditures in university facilities are included in university operating expenses.

[8] Several estimates of expenditure-income multipliers which may be applied to university expenditures are cited by John Caffrey and Herbert H. Isaacs, *Estimating the Impact of a College or University on the Local Economy* (Washington, D.C.: American Council on Education, 1971), p. 44.

[9] Charles M. Tiebout, "The Community Economic Base Study," Supplementary Paper No. 16 (New York: Committee for Economic Development, December 1962).

[10] John Caffrey and Herbert H. Isaacs, p. 44. City of Calgary employment is approximately 1/5 in the manufacturing sector and 2/5 in the trade and service sectors. Calculated from: "Estimates of Employees by Industry," *Alberta Business Trends* (Edmonton: Alberta Bureau of Statistics, January-December 1971 issues).

[11] John Caffrey and Herbert H. Isaacs, p. 44.

[12] A sensitivity test was performed on this assumption using historical University of Calgary and City of Calgary data. The test yielded ratios only slightly higher than those calculated using this assumption.

[13] Another university impact is changes in nearly relative real estate prices. A comparative analysis of residential lots and houses at various distances from the university was done. Ratios of selling prices to assessment values in close and distant areas were compared for houses with similar living areas and lot sizes. The analysis shows that the university may have inflated selling prices of proximate homes. The location of The University of Calgary in a new section of a rapidly expanding urban region may make this observation peculiar to universities in this sort of physical environment.

[14] Dominion Bureau of Statistics, *Urban Family Expenditure, 1967*, Catalogue #62-530 (Ottawa: Queen's Printer, March 1971), p. 31 (Edmonton pattern).

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THE USES OF COST DATA IN INSTRUCTIONAL PROGRAM EVALUATION

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Higher education finds itself in a rapidly changing world in virtually all dimensions from the basic economics of financing to patterns of demand for programs of study. A leveling off and projections of actual decline in enrollments from the "traditional" 18-24 age student group are being heard with increasing frequency. A multitude of new innovative educational programs ranging from the use of complicated multimedia technology to the "University Without Walls" and degree by examination are being proposed and tested. Institutions find themselves facing unprecedented financial hardships and many proposals for changing basic methods of support for post-secondary education. Faculty and staff union organizational efforts are increasing. Student tuition and other costs are rising and student interest in administrative affairs is increasing at at least a comparable rate.

The consequences of such dimensions of change are well known to those concerned with management at institutions of higher education: increasing pressures from state and federal agencies and from alumni for "accountability;" increasing pressures from students for "Relevance" (however this may be defined); and increasing pressures from all funding sources for "Efficiency." The sum of all this is that the instructional process of programs, both traditional and new, are coming under pressure for review as never before.

Instructional Program Reivew, an Economist's Approach

I propose that the basic criteria around which the review of any instructional program be built be that there is a demonstrable demand for the outcomes of the program. That is, the establishment of a new instructional program or the continuation of an existing one should rest upon evidence of a significant and reasonably consistent demand especially with respect to the next decade.

There are two dimensions to this really very basic proposition: the first concerns "student demand" and the second concerns the "social demand" or the needs of society in general.

The most important dimension must be student demand and for students it can be assumed the demand is a function of:

1. The extent to which any educational program resuhs in "certification" which is not achievable in another program and which is necessary to achieve some post-educational goal (usually, but now always, employment); or
2. the degree to which the program is unique and offers an educational experience which is stricly for its consumption value; or
3. the degree to which the program provides important educational support or "service" to other programs which are in great student demand.

In assessing student demand it must be remembered that in all public institutions of higher education, and most private ones as well, the student is required to pay considerably less than the actual variable costs associated with his educational program. This is due to the fact that institutional subsidies, whether derived directly from taxes or ultimately from "tax supported" endowment funds, result in substantially lower and generally more evenly distributed student-borne educational costs than would be the case in an environment where all or most of the variable instructional costs would be charged to the student. An advantage of the latter situation, which would certainly involve some significant student aid, is that the mere existence of any program in itself would imply "sufficient" student demand. However, in the situation where costs to the student are significantly below instructional costs *and* where the student-borne costs do not vary appreciably according to actual differences in instructional costs across educational programs, a different pattern of student demand emerges. Those programs which are relatively high in actual instructional cost enjoy *relatively* higher student demand and those with relatively low instructional cost have *relatively* lower student demand than the case in which student fees would vary in relation with differences in long-run variable instructional costs.

In the former situation, without some review process, it would not be unexpected to find a larger menu of educational programs (some perhaps very small and perhaps high in cost), since there is not differential burden to the student for experimentation on the part of the institution in offering small and/or specialized programs and con-

tinuing even those which prove "unsuccessful" in terms of student interest. In contrast, in the case where student costs are directly related to actual instructional costs one would expect to find no student demand at all for those programs for which size or some other aspect carries unfavorable cost implications, *and* where the educational result of the program, whether certification of consumption in nature, could be obtained almost as well in other lower cost programs.

Evaluation of student demand should explicitly take this fact into account since, *ceteris paribus*, relatively low instructional cost programs would be expected to expand and relatively high instructional cost programs would be expected to contract under a more "normal" (in the economic snese) pricing and financing scheme.

Of course the dimension of public need or social demand is important since it is presumably this on which any subsidy is justified. Any instructional program may produce useful outcomes which do not accrue to the student. These are generally said to be research or public service in nature and such outcomes must be weighed in judging ultimately the value of any instructional program. Evaluation in this regard should attempt to identify whether or not the social outcomes vary in significance according to the identified differentials in subsidy, composed of the difference between student-borne costs and actual instructional costs as discussed below.

Another dimension which relates very much to student demand, expecially in the sense of "potential" demand might be termed program "effectiveness."

Three critical dimensions of effectiveness are:

1. The success of students who complete their educational program (vis-a-vis those who do not) in achieving some post educational goal, usually employment;
2. The percentage of students who ultimately complete the program; and
3. The average and variance around the average of length of time required for completion.

The considerations of effectiveness are important because student demand as viewed in terms of numbers of students in any one time period represents only a snap shot of programs. Programs which are identical on a snap shot basis may be very different in the long term demand/effectiveness sense.

These factors — student demand, social demand and program effectiveness should be considered in the process of evaluating instructional programs in higher education as it generally exists today, with subsidy schemes which lower and more evenly distribute student-borne instructional costs so as to alter the "natural" pattern of student demand.

The Role of Cost Analyses

How then does cost analysis relate to the very complex process of instructional program evaluation as discussed above? I propose that there are really two roles, each of which requires a different kind of cost information.

The first role is to determine the ranking of departments on the basis of what student-borne costs *would be* if derived on the basis of actual differences in instructional program costs. What does this mean? It means that to evaluate the extent of student demand for any instructional program, the relative "potential price" position of the program in the above sense should be considered and the intensity with which evaluation criteria are applied should be in direct portion to the potential price ranking of the department. That is, high priced programs should be scrutinized more intensely than relatively low priced ones in attempting to assess:

1. What factors underlie existing student demand, to answer the question, "What would happen to student demand (increase, decrease remain about the same) if student tuition and fees were charged to reflect relative program unit costs," and
2. Defining and measuring the extent and value of the social outcomes associated with the instructional process.

In essence this amounts to "subjectively simulating" what would happen to program student demand should student-borne costs (prices) reflect program costs, and evaluating the price-reducing institutional subsidies on the basis of the extent to which the instructional program appears to produce significant social outcomes.

The next question then is what costs should be included in constructing relative potential price rankings of instructional programs. The answer I feel is relatively easy in concept but difficult in practice. Conceptually, the costs which should be included are all long-range variable costs that would wind up being charged to students if they were the only source of instructionally related operating revenue. In practice we are talking about long run student average or "unit" variable costs. Wherever possible such costs should be computed on more than one year's experience to gain stability in the estimates and will include:

Direct instructional costs based on course-related costs and an induced course load matrix to translate these into a student base for each instructional program;

Allocation of all other variable costs associated the instructional process, with the allocations on the basis most consistent with the nature of their variability (in so far as possible on the basis of actual user population);

Allocations of quasi-fixed costs (i.e. fixed in the short run) including an estimate for annualized capital costs on a similar (user) basis or simply prorated depending on their nature.

If in fact institutions of higher education were to move to a full or proportional variable cost pricing policy, this is probably how in general student prices would be determined. Resulting potential price estimates must then

be "interpreted" and integrated in the review process with:

Evidence of program uniqueness and the availability of "substitute" programs at the same or other institutions with a lower potential price;

Evidence of the apparent necessity of completing the program to receive the educational benefits;

Estimates of the length of time required for completion of the program; and

Definitive evidence which is available concerning the social outcomes of the program.

The results of a review which integrates information on demand, effectiveness and cost (in the potential price sense) will generally be tentative decisions to expand, reduce, create or even in some instances terminate educational programs. Once this state is reached a *different* kind of cost information is required to ultimately reach and see the consequences of the final decisions. This is *program related* cost information, which identifies the cost implications of changes in the activities of the various academic and other units within the institution caused by the change in status of the educational program under review. Such program-related costs would include:

Incremental course cost changes (if any) in the parent department associated with changes in the educational program;

Incremental costs in the parent department's Research and Public Service activities (if any) caused by the change in status of the educational program under review;

Incremental course costs changes (if any) in other departments cuased by a significant change in the "service load" impact of the new status of the program under review;

Incremental Academic Supports costs (if any) caused by such things as changes in the activity level of libraries, the computer center or other such areas providing academic support to the instructional, research and public service activities of the institution; and

Incremental Student Service (such as housing, food service, counselling, etc.) and Institutional Support (e.g. executive management, general administrative services, logistical services, physical plant operations, etc.) costs associated with changes in the status of the educational program under consideration. (Unless the program is a major one involving a large number of students, the incremental impact upon institutional support is likely to be minimal).

The point to be emphasized is that the kind of information required to assess the resource impact of changing educational programs, either upward or downward, are the costs associated with the incremental changes in the various activities involved in or related to the educational program under review. This is *not* the student-based potential price (long-run unit cost) information described previously and useful for the early stages of review in assessing the significance and stability of student demand and the relation of social outcomes of the program to the implied price subsidy involved. *It is very important that these two kinds of cost information not be confused and used interchangeably and thus incorrectly.*

The relevant incremental program-related cost information is generally very difficult to derive since it requires among other things identification of:

Where students in the program under review come from or go to with a major change in program status, and what are the course, academic support, student service and institutional support changes in level of activity implied by such a shift; and

What is the fixed/variable nature of the cost associated with those course or other activities so impacted (here consideration may be required of such things as the tenure status of faculty and union agreements).

There is no simple formula and a great deal of "judgement" is required in making such calculations. Also, it must be emphasized that "allocation" in the traditional sense, as associated with student based "unit costing" is not relevant, and only those program costs which can be identified as changing due to a change in the status of the program under review should be included.

Summary and Recommendations

In summary the following points have been made:

1. For the evaluation of educational programs in higher education today, there are two kinds of cost information which are required.
2. In the evaluation of student demand, program effectiveness and the social value involved with the instructional process pricing cost data is appropriate. This amounts essentially to long-run student-based variable or "unit" cost information, which includes allocations of all related costs including support costs, even those qhich are quasi-fixed in the short run.
3. Once the evaluation of the program is made and program changes appear to be indicated, a different kind of cost data, INCREMENTAL PROGRAM COST information, is required to judge the resource impact of the potential changes.

Institutions, state coordinating bodies or other agencies concerned with the evaluation of instructional programs must have the capabilities to estimate *both* kinds of costs, and at a level of disaggregation which will not artificially gloss over significant differences in either potential prices or program costs. This requires the capability to calculate direct instructional costs both by course and by student as a base. It requires the capability to identify "induced" loads on a student major/course and instructional program/department basis. Finally, it requires the ability and effort to identify the "nature of variability" of

Academic Support, Student Service and Institutional Support costs as well as those related to the instructional departments themselves.

There are no standard formulas or models which can replace judgement in such cost analyses. On the other hand, the proper data base and calculation capabilities are required for *informed* judgement to be possible in the process of instructional program evaluation.

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A NEW LOOK AT TENURE

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Tenure, a term that suggests both sinecure and academic freedom, continues to undergo scrutiny under the auspices of much publicity. In recent months almost every professional periodical on higher education has devoted at least one article to the subject of tenure. *The New York Times*, the *Wall Street Journal*, and countless lesser known newspapers are also carrying articles about the debate. There is also the proliferation of such books as *The Tenure Debate*, *Tenure, Aspects of Job Security on the Changing Campus*, and *Tenure in American Higher Education* that are devoted entirely to the issue of tenure. On the local level many institutions (e.g., University of Utah, Wisconsin, Michigan State University, etc.) have spent innumerable faculty and staff man-hours on committees studying the nature of tenure. On the national scale the Commission on Academic Tenure in Higher Education, sponsored by the AAUP and the Association of American Colleges, has just concluded a two-year study. Predictably, along with a few subtleties graced by conventional laments about the abuses of tenure, most analysts continue to wave the American flag with both hands while arguing for the survival of tenure with a few reforms, of course, on the ground that it is a necessary undergirding of academic freedom.

Since the term tenure has already undergone its share of transplants, biopsies and, in some cases, even autopsies, this analysis shall refrain from further attempting to justify the existence of tenure. Instead, we will look first at several tenure trends in American higher education and, second, at several braoder issues in higher education which have the potential for affecting tenure. We will pose numerous questions as to whether current tenure trends can be supported in the future. Third, several solutions resolving the current tenure crisis are offered, including a proposed new basis for analyzing tenure data.

Current Tenure Trends

The first question posed concerns whether rank distribution and tenure are currently at a dangerous level. For this analysis a "dangerous level" is defined as a situation where fixed commitments of institutional staff resources have created inflexibility, with program change difficult and perhaps nonexistent. The Commission on Academic Tenure in Higher Education (1973) recently stated that higher education is, in academic jargon, "tenured in;" others in recent months have called the current crisis the "tenure squeeze." In a very general sense, the Commission's report concludes that about half of the half-million faculty hold tenure, with tenured faculty ranging from 25 percent at some institutions to 80 percent at others, with most institutions tending toward the latter situation.

Probably some of the more reliable position indicators of tenure trends are faculty-by-rank distribution, potential faculty eligible for tenure, and actual tenured faculty rates. Tenure is not always related in direct proportion to rank, therefore the percentages of faculty holding the rank of associate or, on occasion, the rank of full professor is not necessarily indicative of the actual percentage of faculty holding tenure. Three procedural circumstances are the cause of these discrepancies. First, some institutions award tenure to instructors and assistant professors upon reappointment after the successful completion of a probationary or term period. Second, some institutions issue appointments to the top two ranks on a probationary or term basis rather than give automatic tenure. Third, the base for the computation of the percentage of faculty on tenure varies considerably among institutions.

Rank Distribution

Aside from these cautionary limitations one can estimate, with a certain degree of accuracy, trends about tenure by looking at the rank distribution. For example, Table One indicates the percentage of faculty members at the four basic ranks in land-grant colleges and state universities for the years 1951-52, 1961-62, and 1971-72. From these data one can conclude that as the rank distribution of faculty moves from instructor to professor, more faculty become tenured. Furthermore, one can assume, that since the percent of professors has increased by 6.5 percent, the number of tenured faculty has probably increased at least an equal factor.

The trends which show the rank distributions of state universities and land-grant colleges differ somewhat from distributions of a more heterogeneous group of institutions. For example, Trow (1973), in his large national survey of faculty in a random sample of over 300 institutions in 1969, found the following rank distribution:

Table 1
PERCENT OF FACULTY MEMBERS AT FOUR BASIC RANKS IN LAND-GRANT COLLEGES AND STATE UNIVIERSITIES, 1951-52, 1961-62, 1971-72

Rank	1951-52 [a]	1961-62 [b]	1971-72 [c]
Professor	26.7	27.8	33.2
	)47.7	)52.1	)58.2
Assoc. Professor	21.0	24.3	25.0
Ass't Professor	28.7	28.4	30.8
	)52.4	)47.9	)41.8
Instructor	23.7	19.5	11.0
	100.1	100.0	100.0

a) 68 Land-Grant Colleges
20 State Universities
Data from Faculty Salaries in Land-Grant Colleges and State Universities, federal Security Agency, Office of Education, Circular No. 358, 1951-52.

b) 57 Land-Grant Colleges
82 State Universities
Data from Salaries Paid and Salary Practices in Universities, Colleges, 1961-62. Higher Education Series, Research Report 1962-R2, Research division, National Education Association, February, 1962.

c) 57 Land-Grant Colleges
40 State Universities which includes numerous state university systems such as Wisconsin, CUNY, and California, etc. Faculty data were taken from the "Annual Report on the Economic Status of the Profession, 1971-72," AAUP Bulletin, 58 (2) Summer, 1972, pp. 201-233.

Professor	25.4%
Assoc. Professor	24.0%
Total	49.4%
Ass't Professor	30.5%
Instructor	20.1%
Total	50.6%

Evidently, the more graduate-oriented the sample of institutions, the more likely the upper ranks will hold a higher proportion of the tenured faculty. This inference is strongly supported by figures in Table Two, which exhibits the rank distribution of 1,244 institutions listed in the AAUP annual survey, the rank distribution of 130 graduate institutions included in the recent ACE study (Roose and Andersen, 1970), and the rank distribution of the Big Ten, all for 1971-72. The Big Ten, comprised of institutions which are highly graduate-program oriented, have the highest percentage of upper-ranked faculty.

Faculty Eligible for Tenure

The trend of tenured faculty is also directly affected by the number of faculty eligible for tenure, i.e., in the tenure stream.[1] A current OIR tenure study at Michigan State University[2] shows that of 62 universities who responded, faculty eligible for tenure in the four ranks increased 5.1 percent between 1970-71 and 1972-73, as shown in Table Three.

Furniss (1972) found that of the 413 institutions he surveyed, 33.3 percent award tenure to instructors and 85.2 percent award tenure to assistant professors. Shaw (1971)

Table 2
COMPARISONS OF FACULTY RANK DISTRIBUTION FOR 1971-72*

Rank	1,244 Instit. of AAUP		130 ACE[a]		Big Ten	
Professor	25.3%		33.4%		36.4%	
		)49.8%		)58.6%		)60.8%
Assoc. Professor	24.5		25.1		24.4	
Ass't Professor	35.6		31.3		27.9	
		)50.2		)41.4		)39.2
Instructor	14.6		10.4		11.3	
	100.0		100.0		100.0	

*Source: "Annual Report on the Economic Status of the Profession, 1971-72." AAUP Bulletin, 58 (2), Summer, 1972, pp. 201-233.

[a] Lawrence Institute of Paper Technology, Peabody College, and the University of Delaware, are not included. Figures include the entire University of Wisconsin and the University of California Systems.

determined in his study of 80 state universities and land-grant colleges that 46.3 percent offered tenure to assistant professors and 27.5 percent offered tenure to instructors. Awarding tenure to the lower ranks is not necessarily a recent phenomenon, for Pfinster (1957) learned in his study of 128 colleges that 34.4 percent award tenure to assistant professors and 44.5 percent to instructors.

Faculty Tenure Rates

Actual faculty tenure rates are still the best indicator of tenure trends. Previous research also shows that in most institutions about half the faculty hold tenure appointments; however, the range of variation is quite extensive. Shaw (1971) found that 52.2 percent of ranked and all other instructional faculty in 60 state universities and land-grant colleges were tenured. Furniss (1972) concluded that over 50 percent of all instructional faculty are tenured at 46.1 percent of the public universities, 61.3 percent of the private universities, 34.2 percent of the private four-year colleges, 37.1 percent of the public four year colleges, and 43.1 percent of all 413 institutions which responded.

The current OIR tenure study of 62 graduate institutions as shown in Table Three found that the number of tenured faculty increased by 9.7 percent between 1970-71 and 1972-73. The number of tenured faculty increased slightly less than twice as fast as the number of faculty eligible for tenure and about a third faster than the number of all ranked institutional faculty over the same two-year period. Table three also shows that over the two-year period, in the upper two ranks, the number of ranked instructional personnel increased by 10.3 percent, the number of faculty eligible for tenure increased by 9.2 percent and the number of tenured faculty increased by 10.6 percent. These figures indicate that faculty in the upper two ranks has increased approximately 10 percent for all three categories (ranked instructional faculty, faculty eligible for tenure, and tenured faculty) during the last two years.

Trow (1973) stated in his 1969 study of 27,191 faculty that tenured faculty were 51.0 percent of all ranked instructional faculty (includes ranked temporary faculty); 52.6 percent of ranked instructional faculty eligible for tenure; and 49.9 percent of total instructional personnel (ranked and non-ranked, including lecturers, assistant instructors, research associates, and specialists). Compared with Trow, the current OIR study, as shown in Table Four, found that for 1970, tenured faculty were 55.1 percent of all ranked instructional faculty (includes ranked temporary faculty); 59.8 percent of all instructional personnel (ranked and non-ranked). For 1972, tenured faculty were 56.6 percent of all ranked instructional faculty, 62.3 percent of all ranked instructional faculty eligible for tenure; and 47.2 percent of all ranked and non-ranked instructional personnel.

The percentage differences between comparable categories of the Trow study and the current OIR study are

Table 3

COMPARISON OF TENURED FACULTY BY RANKS DISTRIBUTION FOR 62 GRADUATE UNIVERSITIES 1970-71, 1972-73

1970-1971

	I Instructional Faculty[a]	II Faculty Eligible for Tenure	III Tenured Faculty
	N=55,208 %	N=50,847 %	N=30,420 %
Professor	29.6	30.6	50.9
	)54.6	)56.2	)86.9
Assoc. Professor	25.0	25.6	36.0
Ass't Professor	31.4	32.4	10.8
	)45.4	)43.8	)13.1
Instructor	14.0	11.4	2.3
	100.0	100.0	100.0

1972-1973

	I N=58,967 %	II N=53,542 %	III N=33,375 %
Professor	30.6	32.0	51.3
	)56.4	)58.3	)87.6
Assoc. Professor	25.8	26.3	36.3
Ass't Professor	31.6	32.1	9.8
	)43.6	)41.7	)12.4
Instructor	12.0	9.6	2.6
	100.0	100.0	100.0

	I	II	III
Percent of Two-Year Increase for all Ranks	(3759) +6.7%	(2695) +5.1%	(2955) +9.7%
	I	II	III
Percent of Two-Year Increase in Upper Two Ranks	(3113) +10.3%	(2639) +9.2%	(2801) +10.6%

[a] Included are temporary ranked faculty with pay.

Table 4

PERCENTAGE OF TENURED FACULTY AT 62 GRADUATE INSTITUTIONS DEPENDING ON COMPUTATION BASE.

	Total Instructional Personnel [a]	Total Instructional Personnel [a] Who Are Tenured	% of Ranked Instructional Faculty Who Are Tenured	% of Faculty Eligible for Tenure Who Are Tenured
1972	70,693	47.2	56.6	62.3
1970	66,010	46.1	55.1	59.8

[a] Includes assistant instructors, lecturers, research associates, specialists, in addition to all ranked instructional personnel.

attributed partly to the institutions included in each sample. Trow's study concerned faculty from a cross section of higher education while the MSU study focused only on graduate institutions. Nevertheless, both studies indicate substantial differences depending on computation base to calculate the percentage of tenured faculty. The evidence also indicates here that tenure percentages are increasing steadily regardless of which computation base is used.

Even though the MSU study has derived its trend data on two years which are relatively close, one can assume that these trends tend to provide an overall picture of the tenure situation. From the trends shown in the current research and pointed out in previous research, the number of tenured faculty is increasing at a rate (.5 to .7 percent per year) which could easily lead to disastrous consequences in forthcoming years.

Current National Issues Affecting Tenure

In view of the current tenure trend, what are some of the current national issues which make a review of current tenure personnel policies necessary? First, the end of the military draft, higher fees and tuitions, and a phenomenon called "stopping out" by the Carnegie Commission are causing a dramatic slowdown in enrollment growth at the nations' colleges and universities. The 10 percent growth rates of the 1960s have suddenly shifted to a more normal 2-3 percent level, and probably will remain at the lower rate through the 1980's.

Second, coupled with unparalleled enrollment growth during the 1960s was the growth of institutional budgets. Now, in a time of general financial exigency many institutions are finding themselves in a non-flexible predicament. Cheit, in his recent book, *The New Depression in Higher Education—Two Years Later*, claims that the 41 institutions he examined in 1970 have since then "achieved a stabilized financial situation and have gone from a financial condition of steady erosion to one of fragile stability." The stabilized financial situation has been accomplished primarily through extraordinary cuts in expenditures that clearly cannot go on indefinitely. On the other hand, in the past year legislators, as well as administrators, have found that budget reductions, program cutbacks or re-allocations became next to impossible because of tenured faculty.

Third, severe pressures are being exerted on colleges and universities for increased accountability to a variety of agencies and interests including the general public, legislators, governmental agencies, the courts, coordinating and governing boards, faculty, students, and other internal constituents. Mortimer (1972) cites three applications of the term "accountability in higher education:" managerial accountability, accountability versus evaluation, and accountability versus responsibility. All three applications are relevant to the proportion of tenured faculty in an institution.

Related also to the three dimensions of accountability is the trend toward collective bargaining.[3] Will faculty bargaining units begin trading off concepts of academic freedom and tenure for pay increases or reduction in work loads? Or will tenure be bolstered as guaranteed security through collective bargaining?

The fourth issue concerns longevity of current tenured faculty. Miller (1970) claims that the average tenured position extends over a 35-year period, while the average nontenured faculty member stays only for seven years. Consequently, an institution has the choice between one tenured position or 10 nontenured positions over a 35-year period. Keast (1973) and Trow (1973) both claim that within the last few years about 75 percent of all faculty members were under 50 years old, and nearly two-thirds of tenured faculty were under 50. A lower average age distribution will result in fewer retirements for the next ten years.

Closely related to tenured faculty longevity is the issue of over-supply. Faced with a surplus faculty and a scarcity of available positions, institutions are experiencing a decreasing turnover rate because employed faculty are constrained by considerably lessened mobility.

These issues, when placed in the concept of a no-growth faculty situation, exacerbate the movement towards restricting tenure. Certainly such conditions as declining rates of enrollment growth, dwindling financial resources, program reorganization, and fixed or reduced staffs should cause institutions to re-examine the current state of tenure affairs.

Institutional Self-Examination

National trend statistics are not as critical as individual institutional situations. In reviewing your own situation related to tenure levels, consider the following questions. Assuming current personnel practices regarding tenure will continue unchanged, will your institution be able to deal with the following program factors:

* future program shifts and new program development,
* normal salary demands of faculty and staff,
* extra demands of collective bargaining,
* inflation and cost of living increases,
* cutbacks in federal and state funds,
* reversal of out-of-state tuition clause,
* higher cost to retain tenure faculty (assuming that the average salary of a nontenured faculty is about half that of a tenured faculty member)?

In addition to determining an institutional tenure rate and rank distribution, each institution must determine relative tenure rate and rank distribution for each college and department since percentages are not likely to be uniform throughout an institution. In fact, the situation is compounded if high tenure levels were found in declining programs, and not unlikely situation.

Solutions to High Tenure Rates

Up to now, most institutions have not formally instituted any restrictions on the number or percentage of tenured faculty. In the OIR study of 130 graduate institutions, 13.4 percent of 82 institutions who responded indicated they were considering imposing a quota limiting tenure appointments. Furniss (1972) found that only 5.9 percent of 413 institutions (all types) were actually limiting the percentage of tenured faculty as of January, 1972.

Solutions applied elsewhere to the problems stemming from too many tenured faculty include tenure quotas, equalized rank distribution, early retirement benefits, term contracts as opposed to the tenure system, more temporary appointments, appointments of new faculty only to lower ranks, and a general slowdown of the rate of promotion. Of the procedures proposed for dealing with fixed commitment or tenure levels, some results are evident:

a) Utilization of a package of benefits for early retirement does not provide cost savings to the institution but is appropriate for improving the distribution of faculty age or rank.

b) Appointment at a lower rank (instructor versus assistant professor) and increased time between promotions is effective in helping to sustain tenure levels or to reduce them, depending upon its method and rate of application.

c) Stanford University (Hopkins, 1972) found, that if one of its colleges made no additions to tenure while hiring new personnel and allowing for terminations, the tenure proportion would drop from 71 percent back to 57 percent in a ten-year period. Michigan State University would experience a similar kind of result.

d) Term contracts in lieu of tenure have not met with overwhelming favor by those studying tenure and alternative systems.

One key recommendation of the Commission on Academic Tenure in Higher Education (1973) is to extend the probationary period to at least five years before tenure can be granted. Currently more than one-fourth of all institutions have less than five-year probationary terms according to Furniss (1972). The Commission also recommended that tenure quotas be expressed and utilized as "ranges or limits rather than as fixed percentages."

Concept of Flexible Dollars

Probably more important than any of the mechanisms and procedures just given is the need for institutions to consider those factors pertinent to the establishment of what Furniss (1973) calls "steady-state" planning, that is, planning when an institution has stopped expanding, especially in enrollments. The suggestion is made here that tenure percentages of committed positions, however computed, are not the critical factor in analyzing institutional situations. Rather, tenure commitment calculations should be based on *dollars* rather than on *positions*. Table Five shows, that in a hypothetical situation where positions are

converted to dollars, a different picture becomes evident between dollar tenure commitment as opposed to position tenure commitment because faculty in upper ranks consume more dollars per position than lower ranks. On the *dollar* basis 64.60 percent of the total instructional costs is committed to tenured faculty. On the *position* basis 55.00 percent of the total instructional faculty is committed to tenured faculty. This illustrates the point that unless one translates obligations (tenure, tenure eligible, and job security) into dollars the appearances of low-tenured personnel percentages can be dangerously misleading.

Derived from these comparisons is the concept of flexible dollars, which is posed here as a better guide for management and planning in a steady-state situation. Flexible dollars are those dollars that are not committed because of tenure, job security, or the relatively fixed forms of financial obligations. Flexible dollars are dollars (or faculty) needed to accommodate student enrollment shifts among colleges and departments.

It is important for an institution to retain in each budget a sufficient amount of uncommitted dollars for nontenured and nontenured-but-eligible faculty, so that positions and resources can be shifted to accommodate growth areas or provide for new academic programs. This involves applying a university SCH/FTEF average to all colleges and departments and then asking how many staff (FTEF) should be shifted (added or subtracted) from each college to meet instructional need. The shifts in faculty (FTEF) can

Table 5
A HYPOTHETICAL EXAMPLE OF POSITIONS VERSUS DOLLARS.

FTE Positions

	N	Tenured Faculty	Percent of Total Faculty with Tenure
Professors	25	25	25
Assoc. Professors	25	22	22
Ass't Professors	25	8	8
Instructors	25	0	0
	100	55	55

FTE Dollars

	N	Tenured Dollars	Percent of Dollars For Tenured Faculty
Professors	$550,000	$550,000	33.3
Assoc. Professors	450,000	396,000	24.00
Ass't Professors	375,000	120,000	7.27
Instructors	275,000	—	—
	$1,650,000	$1,066,000	64.60

then be derived and converted to dollars, from which a percentage figure of the total instructional budget is estimated for each year.

Hiring people at a lower rank and/or at a temporary rank would improve the tenure ratio and would allow for a certain staff flexibility; however, the question of dollar flexibility rather than position flexibility may be unwisely ignored under such a procedure. Unless the number of people on tenure or with tenure-like job security is reduced, the institution's dollar flexibility has not improved. Holding constant the level of tenured people while increasing certain nontenured faculty makes an improved ratio but not necessarily an improved dollar situation. For example, consider a reduction in programs cutting into temporary or nontenured personnel only, while leaving tenured staff alone. This is an attractive approach but generally an unrealistic one for long-range planning and management because the long-range dollar flexibility is further impaired. That is why some institutions have chosen to reduce entire programs, thus reducing fixed obligations.

From the hypothetical situation in Table Five, 55 percent of tenured faculty translates into a dollar commitment of 60 to 70 percent of the operating budget. This table indicates that approximately 10 to 15 percent must be added to an institution's tenure personnel percentage figure to obtain actual dollar commitment or the relative amount of inflexible dollars. The question here is at what level would the percentage of positions become dangerously high? The answer, of course, varies according to institution. However, in general, a dangerous level is reached when actual dollars to support committed tenured faculty hinders the institution in coping with the financial constraints spoken of earlier. A maximum level will also depend on salary levels and the total position base for computing tenure. If one included other personnel in the base, such as graduate assistants and assistant instructors, then the dollar factor is enlarged.

Because of factors such as future enrollment levels, state funding levels, degree of legal commitment to university personnel other than faculty, the changing nature of federal support, and external comparative data, one would conclude that for many institutions tenure levels and upper rank percentages are very close to their maximum. Certainly, it seems unwise to allow commitments to grow much beyond current levels if an institution is to be able to handle any unknown future while retaining flexibility and institutional vitality. One the other hand, there is no current evidence available which readily encourages institutions to reduce their pattern of commitments.

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[1] Eligible for tenure includes both tenured and non-tenured faculty.

[2] In early January, 1972, tenure information was requested from the 130 graduate institutions included in the publication by Kenneth D. Roose and Charles J. Andersen, *A Rating of Graduate Programs*, Washington: ACE, 1970. Usable information was received from 62 universities.

[3] As of January, 1973, there were bargaining units involving faculties at about 250 (or 8.0%) of 2,800 colleges and universities in the United States. An estimated 75,000 faculty members were covered by these units. The *New York Times* of April 22, 1973, reporting on a forthcoming book (*Governance of Higher Education: Six Priority Problems* by the Carnegie Commission on Higher Education).

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THE TEACHING EFFECTIVENESS OF AN ALTERNATIVE TEACHING FACILITY

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> To an increasingly greater extent we find ourselves being arranged by impersonal environments in lecture halls, airports, waiting rooms, and lobbies . . . . The straight-row arrangement of most classrooms has been taken for granted for too long. The typical long narrow shape of a classroom resulted from a desire to get light across the room. The front of each room was determined by window location, since pupils had to be seated so that window light came from the left shoulder. However, new developments in lighting acoustics, ventilation, and fireproofing have rendered invalid many of the arguments for the boxlike room with straight rows. (Sommer, 1967, p. 151)

Many colleges and universities have sought to overcome the rigidity of the "straight-row" classroom in some of their teaching modules, but few have taken the trouble to see if these new teaching facilities have had any effect on the learning of students

In 1969, the University of Alberta General Faculties Council created a Committee to Investigate Teaching. This committee addressed itself to all facets of teaching, from physical models to pedagogical techniques. One of the projects undertaken by this committee was the designing of an alternative teaching facility.

Three objectives were sought: first, to provide the maximum amount of versatility in intramural design and manipulation; second, to equip it with more visual and tactual stimulants than is normally found in conventional classrooms; and third, to study the effect of a lounge-type classroom on teaching and learning.

Maximum internal flexibility was achieved in the following manner. Seats were portable half-hexagonal boxes which, when stood on edge, could serve as either small work benches or waist-high partitions. Movable panels were suspended from an ellipitical bar on the ceiling. These panels could be strung out the full length of the ellipse, forming an egg shaped "womb", or could be compressed into a few feet, leaving the room open. Each panel could rotate 360 degrees, and could be held in place by means of a locked set of casters. Four banks of electrically charged rails housed incandescent pin lights. Each bank was controlled by a dimmer switch. Each pin light fixture could be: (1) pointed at any locus on a half-sphere, (2) dismounted and moved to another electrical bank in the room, or (3) turned off. Each could hold a color filter.

One could use these three elements, (seats, walls and lights), to create whatever kind of learning site was desired. For example, a class could begin with all students in a single campfire type circle in the center of the room. When the need for buzz-groups arose, smaller groups could move to the corners, and the panels could function as screens. Or the class may sit on one side of the room and view presentations by students on the other side where half-hexagonal boxes could serve as a work area and the panels as backdrops.

The Committee's second objective was to rekindle the learner's sensory awareness. Color and light were its first concern. Color was everywhere: the ceiling was midnight blue; the pin lights had red, blue, green and yellow filters; the carpet was dark green; the boxes were covered with orange and dark green carpet. Only the walls were left white. Natural sunlight entered the room either through the clear window pane or through translucent plexiglass sections in the wall panels. Because the pin lights were directional and operated by dimmer switches, certain areas of the room could be flooded with light while other areas obscured by shadow. Other optical stimuli were present in the plexiglass, plywood and fiberboard patterns in the panels. Tactile sensory input was provided by carpet on the floor and on the box-like seats.

Varying geometric forms were available. Squares existed in the 4' x 4' panel inserts. Seats were half-hexagonal. These accompanied the usual rectangular outlines found in most conventional classrooms. The panels' pseudo-wall structure removed the starkness of the right-angle corners. This elliptical shape developed a group seating which encouraged more eye contact among students while still maintaining Hall's (1966) Social Distance.

A room such as this represents the antithesis of the Essentialist philosophy of education. There are no uncushioned, straight-back, wooden chairs; no controlled, structured surroundings and no "bare necessities" which are the hallmarks of the Essentialists' frame of mind (See Wingo, 1965). "Sesame Street" has demonstrated that one does not have to indulge in regimentation and strict self-

discipline in order to learn. But the question remains — do people learn more in a congenial environment?

Research Design

We hypothesized that learning occurs either equally well, or even better in an Alternative Teaching Facility than in the more traditional setting. Learning was operationally defined as the scholastic performance, as evaluated by a competent grader, of two groups of regular undergraduate students' at the University of Alberta enrolled in two sections of English 275 (Introduction to Prose). Scholastic performance was measured by the letter grades, A-B-C-D-F, given to the students' two term papers and a number grade (1-9, "9" is excellent) given on the final examination.

These two sections were taught by the same instructor (Horowitz) in two different classrooms: 289 Central Academic Building (the experimental setting) and G-114, Biological Sciences Building (the controlled setting). Insofar as was humanly possible, the lectures and discussions in both classes were identical. Mr. Horowitz met with both classes at every assigned meeting. The syllabus reading lists, assignments, term paper topics and final examination were identical.

A Graduate Teaching Assistant in the Department of English, was engaged to grade the papers before Mr. Horowitz read them. She was not informed of the nature of the experiment nor was she given any opportunity to interact personally with the students. Furthermore, she had no idea which studetns belonged to which section, as the term papers and final examination were collected, when due, into one bundle and delivered to the teaching assistant for grading.

The Hanmon-Nelson test of mental ability was administered to the members of both sections during regular class time in the term by Mr. Horowitz.

The Subjects

As this was a field study, the effect of many variables could not be neutralized. We were able to estimate some of their impact, however.

Results from the Hanmon-Nelson test indicate that the two groups of students had essentially the same level of ability. Eighteen of the original 29 students attended class the day the test was administered to the experimental group and 18 of the 32 were in the control class session the day following.

Table I

MEANS AND T-TEST VALUES OF THE VERBAL, QUANTITATIVE AND TOTAL SCORES OF THE TWO GROUPS OF STUDENTS (N = 18 EACH) ON THE HANMON-NELSON TESTS OF MENTAL ABILITY, COLLEGE LEVEL.

Variable	Exper'l	Control	T Value
Verbal	40.78	38.22	-0.88
Quantatative	21.72	22.39	0.35
Total	62.50	60.61	-0.54

(Maximum scores: Verbal, 60; Quantitative, 40: Total, 100)

F Test differences of variances between these groups.

Variable	Exper'l	Control	F Value
Verbal	32.30	118.07	3.655*
Quantative	34.09	29.66	1.149
Total	50.03	160.02	3.199**

*$p < .01$ ** $p < .025$

The control group had a much wider range of "intelligence," as measured by this test. Overall, the average score on the verbal portion of the test was *lower* than that of the experimental group but slightly higher on the quantatative portion. The t-test failed to display any significant differences in the verbal or quantatative recall of these two groups. One can conclude that the experimental group did slightly better in the verbal area because it had a much smaller variance about the mean than did the control group.

The schools and colleges represented by these two groups of students were unmatched. More students were from the faculty of Arts and the school of Dental Hygiene in the experimental group, while more students from the faculties of Agriculture, Business & Commerce, Engineering, Pharmacy, Physical Education and Science were in the control group. The bias, therefore, tends to lean towards the experimental group, as many more Arts students were enrolled in the experimental group.

The initial male-female registration figures, Table II, showed a distinct partiality towards the experimental group.

Table II
A 2 X 2 CHI-SQUARE MATRIX OF MALES AND FEMALES

	MALES	FEMALES	TOTAL
Exper'l	8	21	29
Control	19	11	30
TOTAL	27	32	59

$x^2 = 7.59$ $df = 1$ $p < .01$

The high number of females in the experimental group suggested a better grade achieving performance from that group. Carter, 1952; Edmiston, 1943; Maney, 1933; and Schmuck, 1965 have all demonstrated that female students, *ceteris paribus*, received higher grades than male students.

There was no significant difference in the class standing (Freshman, Sophomore, etc.) of the two groups as only one individual in each group was beyond Freshman standing. In terms of age, no differences were noted. The average age of each section was eighteen.

The control group had the preferred time of day (Tuesdays and Thursdays from 1:00 to 12:30), while the experimental group met at 8:00, Mondays, Wednesdays, and Fridays. The room used by the control group was somewhat less desirable than even a typically traditional classroom in that it had no windows, a fairly low ceiling and a propensity for echo.

A survey of these intervening variables indicated that the members of the experimental group would have had a slight advantage over their counterparts in the control group.

Results

As Table III clearly shows, there were no differences between the grades received by the Experimental and Control Groups for the two term papers and final examination.

The assumption that this alternative teaching facility is *as* conducive to learning as is a traditional classroom can be supported, but the premise that the facility is *more* beneficial to learning (as herein defined) is not supported.

TABLE III
Chi-Square Comparisons of the Grades Given the Two Groups of Students Registered in Two Sections of English 275

FIRST TERM PAPER

GRADE	EXPERIMENTAL GROUP	CONTROL GROUP	TOTAL
A	2	1	3
B	9	11	20
C	10	10	20
D	5	5	10
F	0	1	1
TOTAL	26	28	54

$x^2 = 1.46$ df = 4 $p < .80$

SECOND TERM PAPER

GRADE	EXPERIMENT GROUP	CONTROL GROUP	TOTAL
A	1	2	3
B	7	7	14
C	11	10	21
D	3	3	6
F	0	1	1
TOTAL	22	23	45

$x^2 = 1.36$ df = 4 $p < .85$

FINAL EXAMINATION

GRADE	EXPERIMENTAL GROUP	CONTROL GROUP	TOTAL
9	0	1	1
8	4	4	8
7	8	7	15
6	11	5	16
5	4	3	7
4	0	3	3
3	0	1	1
TOTAL	27	24	51

$x^2 = 7.31$ df = 6 $p < .30$

Discussion

We do not feel that grades alone reflect all that had occurred in both classrooms. (See Maslow & Mintz, 1956 and Mintz, 1956). A number of differences were noted in the behavior of the sections. As the term wore on, we noticed that attendance was far better in the experimental class in spite of its being held at 8:00 a.m. The students in the experimental group were more ready much earlier in the term to participate in class discussions, and by late October, were actively debating quite freely among themselves and with the instructor, all of this with little urging from the instructor. Students in the control group, on the other hand, needed prodding throughout the term and were by and large content to sit silently through most classes.

No observable differences existed between the students in either group on the dimension of receptivity to the material presented, but, as an example, half of one class session in the experimental group was devoted to examining the reasons why the class thought the book assigned for that meeting was "utterly boring." Students in the control group no doubt shared the same opinion of the assigned reading, but no one thought to complain.

We noticed more informality and group cohesion in the experimental group than in the control group. More of the students in the experimental group were addressing each other by first names, and this occurred between students registered in different faculties. In contrast, few students appeared to know, or even recognize, their classmates in the control group.

Finally, Horowitz reports that visits during office hours were more numerous from students in the experimental group than from students in the control group, and that during these visits, those from the experimental group seemed more at ease than those from the control class. During the second term (English 275 was a first term course) several of the students from the experimental section continued to visit the instructor, who never saw anyone from the control group again.

Surprisingly, the cost of furnishing an Alternative Teaching Facility is close to the cost of equiping a traditional lecture room. Room 289, Central Academic Building did cost more than it should, and more than the traditional classroom does, but this difference was chiefly due to miscalculations in planning the pilot project and the need to rewire the light fixtures. A second such teaching facility has been furnished in another building on campus. When the cost of the traditional furniture was deducted from the $2,500 spent for reconversion, the next expense for the second room was approximately $1,000. Here, again, $500 was spent in removing flourescent fixtures and installing incandescent lamps. It would be safe to estimate that the chief difference in furnishing a room such as 289, Central Academic Building in a building under construction would be the price of a carpet.

Recapitulation

An Alternative Teaching Facility was created in order to provide a more stimulating environment for learning. The results of the students' work in the cognitive domain, when measured in terms of the conventional system of grading, showed no noteworthy change. Informal interaction, both between students and between instructor and student, elements of the affective domain, did, however, increase.

One final comment. Within the last twenty years, psychologists such as Hebb have begun to explore the effects of sensory deprivation on human beings. They have learned that human subjects, when deprived of normal sensation for extended periods of time become bored, restless, mentally lethargic, and have reported an inability to engage in prolonged throught. (See Altman, 1971; Heron, 1957; Hebb, *et al.*, 1954; and Vernon & Hoffman, 1956). In an effort to provide the maximum amount of space per capital budget dollar expended, administrators and architects have continued using rectangular box-like cubicles with bolted down ranks of seats facing front, in an environment of bland monochromaticism, washed in uniform (shadow diffusing) flourescent illumination, and covered with sterile smooth-surfaced floor tile. (See Bechtel & Srivastaba, 1966; Black, 1950; Cooper & Zubek, 1958; Kyzar, 1971; Maslow & Mintz, 1956; Mintz, 1956; Reichert, 1973; Sommer, 1969; and Wotton, 1970)

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RESEARCH REPUTATION AND TEACHING QUALITY IN UNIVERSITY DEPARTMENTS

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Studies of the relationship between research and teaching have provided little support for either side in the ongoing debate of the relationship between teaching and research. Voeks (1962), Stallings and Singhal (1970), and Hayes (1971) all found no significant relationship between publication rate and student ratings. Only Bresler (1968) found a positive relationship between research and teaching: at Tufts University, faculty who had received research grants received higher student ratings than those who had not. And the most recent review of existing research and opinion clearly presents the need for further inquiry (Page, 1972).

Measure of Research Reputation

This study differs from the earlier research mainly in that we examined the research productivity and teaching quality of departments, rather than of individual faculty members. The measure of departmental research reputation was from the most recent American Council of Education Rating of Graduate Programs (Roose and Anderson, 1970). Since a department's A.C.E. rating is based upon a nationwide survey of scholars in that field, it is essentially a measure of the quality and the quantity of research conducted by the faculty of the department.

The data provided in the A.C.E. report enabled us to devise two systems for ranking University of Washington departments according to research reputation. In the first (or raw score) system, the departments were ranked according to the percentage of respondents who ranked the department's faculty as distinguished and strong. The second (or percentile) ranking system was based on each department's relative rank among the other departments of that discipline across the country. For each of the seventeen University of Washington departments, we calculated a national percentile score, and then the departments were ranked on the basis of this score. (See Table 1.)

The difference between the two ranking systems is that in the raw score system, University of Washington departments were compared with each other directly, whereas in the percentile system, the departments were compared first with their field nationally, and then with the other University of Washington departments. The purpose of the percentile ranking system was to reduce possible differences in the generosity of raters among the various disciplines.

We also gathered departmental operating data, which served as additional indicators of departmental research activity. This included (among other data) the percentage of faculty time spent on research.

Measure of Teaching Quality

To measure teaching quality, we designed a new student rating form. Since we wanted to insure maximum agreement on the meaning of a response, we employed a format of scale descriptors to aid the respondent.

The choice of items was determined by our desire to keep the instrument short while accommodating two kinds of scales: those that measured the incorporation of research into teaching, and those that measured the generally-accepted attributes of good teaching. The research-oriented scales were: Knowledge of Subject, Currentness of Material, and Use of Own Research. All of the research scales and most of the general scales were chosen from those that discriminate well between the best and worst teachers (Hildebrand, et al., 1971). (See Illustration.)

Sample

From a list of individual programs of studies provided by the Registrar, 1106 students taking courses in the seventeen departments were randomly selected to receive the rating form. Returns were received from 58% of the sample; therefore, our analysis was based upon 643 student ratings. To protect the anonymity of individual instructors, the returned ratings forms were identified only by department and level of instruction.

Results

Using first the raw score ranking system, rank-order correlations were calculated between A.C.E. ratings and mean student ratings on all items, and between A.C.E. ratings and mean student ratings on the research items alone. The correlations were .16 ($\overline{X}_{18}$) and -.07 ($\overline{X}_{8}$) —

TABLE I

RAW-SCORE, PERCENTILE, AND STUDENT-RATING RANKS BY DEPARTMENT

	Department	ACE RAW SCORE RANK: Percentage Who Rated Department Distinguished and Strong	R	ACE PERCENTILE RANK: X/∑x	% ile	R	STUDENT RATINGS RANK: $\bar{X}$ 1-8	$\bar{X}$ R
HIGHER	Geography	58	1	6/34	82	2	5	3
	German	49	2	12/48	75	8	8	8
	Mathematics	40	3	18/102	82	2	15	16
	English	39	4	12/92	87	1	7	12
MIDDLE	Sociology	36	5	13/73	82	2	6	7
	Anthropology	29	6	16/42	62	16	3	4
	Physics	25	7	20/113	82	2	11	14
	Chemistry	22	8	24/125	81	6	14	13
	Psychology	17	9	27/110	75	8	10	9
	French	16	10	19/63	71	14	1	1
LOWER	Economics	*	11	19/91	80	7	16	15
	Geology	*	11	22/69	69	15	2	2
	Mechanical Engineering	*	11	20/71	73	10	17	17
	Music	*	11	18/43	59	17	13	10
	Philosophy	*	11	19/65	72	13	4	5
	Political Science	*	11	21/74	73	10	12	6
	Spanish	*	11	18/65	73	10	9	11

*These departments are in a score range placing them below French, but no percentages were given. They are listed alphabetically.

Illustration

The following scale consists of qualities which instructors may possess to varying degrees. Please rate the instructor of the course listed above on each the the qualities. Each quality is divided into three sections, and each section into three degrees, numbered accordingly from 1 to 9. In rating, circle the number which best describes your instructor.

	1 2 3	4 5 6	7 8 9
ENTHUSIASM FOR SUBJECT	Is definitely enthusiastic about matter of course.	Is at times enthusiastic about subject matter.	Seems to teach course without enthusiasm.
KNOWLEDGE OF SUBJECT	Definitely an expert; well-read and experienced.	In good command of subject matter.	Unsure of subject matter; not well-read.
TOLERANCE	Encourages and accepts widely differing points of view.	Accepts views somewhat differing from his own.	Discourages differing points of view; intolerant.
CURRENTNESS OF MATERIAL	Keeps course up to date; presents results of current research or scholarship; introduces still-debateable issues.	Occasionally mentions current or recent research in the field.	Course preparation could have been made years ago.
PRESENTATION	Stimulating and exciting.	Moderately interesting.	Puts you to sleep.
AVAILABILITY TO STUDENTS	Is often available and easily approached for formal or informal contact in addition to posted office hours.	Reasonably friendly; can be approached after class and during posted office hours.	Resists student contact, rarely available after class; rarely keeps, or has no regular office hours.
USE OF OWN RESEARCH	Consistently incorporates own research into course.	Occasionally incorporates own research into course.	Little or no evidence of involvement in research.
PREPARATION	Shows definite evidence of careful preparation.	Shows some preparation.	Not well prepared.

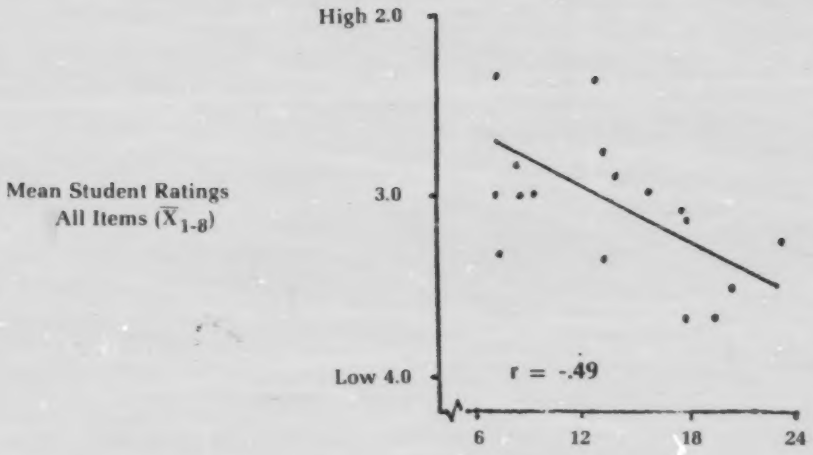
both insignificant. Having found no overall correlation between research reputation and teaching quality, we then compared departments by field of study. For the social sciences alone, we found a slight positive relationship between A.C.E. ratings and student ratings on the research-oriented items. This suggested that for the social sciences, at least, departments with greater research reputation may incorporate research into instruction more than those of lesser reputation.

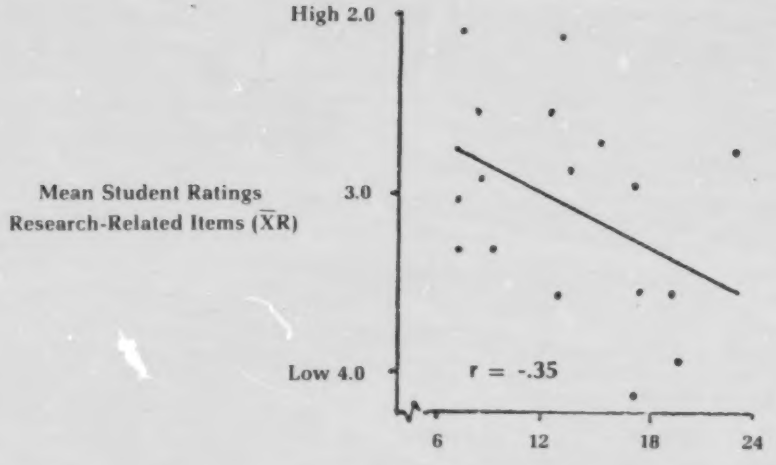
We next calculated the rank-order correlation between A.C.E. ratings and student ratings, using the percentile ranking system. This time, we found slight negative correlations: -.37 ($\overline{X}_{10}$) and -.56 ($\overline{X}_{R}$). The negative correlation between national percentile ranking and student ratings on the research-oriented items was statistically significant at the .05 level. This suggested that those departments which had the highest relative rank in the country were perceived by students as incorporating research into teaching to a lesser extent than those with lower relative ranking.

When the data were analyzed in an attempt to account for this finding, we discovered that the major contributors to this negative correlation were the physical sciences. For example, Math and Physics were tied for second in percentile rank, yet received nearly the lowest student ratings on the research-oriented questions.

This finding, together with the slight positive relationship found for the social sciences in the raw score ranking system, led us to conclude that there might be significant differences in the research-teaching relationship among the various fields of study as well as among departments within fields. It is also possible that these relationships are obscured when all departments are combined together for analysis.

Figure 1


High 2.0
3.0
Low 4.0
Mean Student Ratings
All Items ($\overline{X}_{1-8}$)
r = -.49
6
12
18
24
Percentage of Faculty Time Spent on Departmental Research


High 2.0
3.0
Low 4.0
Mean Student Ratings
Research-Related Items ($\overline{X}$R)
r = -.35
6
12
18
24
Percentage of Faculty Time Spent on Departmental Research

The differences in the research-teaching relationship among various fields of study appear to be the result of three major subject matter differences. First, subject matters differ in characteristic type of research (ranging from experimental to general scholarship) and in the extent to which incorporation of research into classroom instruction can be recognized and evaluated. For example, in the social sciences, research is generally experimental or descriptive. Methodology is stressed and studies are always referred to by author, so it is highly unlikely that a professor could refer to his own work without a student's being aware of it. In literature or philosophy, however, students are unlikely to know whether an idea presented by a professor came off the top of his head, from notes he took in a graduate seminar, or was the result of scholarly research.

Second, subject matters differ in the size of the gap between undergraduate and graduate level of understanding. For example, current research in psychology or sociology can usually be understood by students even in introductory classes, whereas it would be very difficult to explain the latest research in physics to beginning physics students.

Related to this are subject matter differences in the size of the gap between the educational needs of the generalist and specialist. Here again, the gap in the social sciences appears to be smaller than that in the physical sciences. For example, the latest research on cognitive dissonance may help the freshman in a survey course to better understand his behavior, whereas the latest research on neutrons is of doubtful relevance to the nursing student taking a "service course" in chemistry.

As a result of these findings, we feel that future studies of the relationship between research and teaching need to be undertaken at the subject matter level, by specialists in that field working with specialists in institutional research. Such studies might compare departments across several universities. One of the less complex variables to examine is time. For example, in this study we examined by department the relationship between quality of teaching and the percentage of time spent by teaching faculty in research. A negative correlation was found. As the regression lines in Figure 1 indicate, this relationship was almost identical for teaching quality as measured by the means of all items($\bar{X}_{1\text{-}8}$) and that measured by the means of the three research-related items($\bar{X}_R$).

Conclusion

In closing we emphasize the tentative nature of our findings and urge that more delicate and sophisticated analyses be undertaken. Some of the factors to be considered have been suggested by this study. However, several additional considerations need to be taken into account in future studies of research and teaching. The first of these is the difference in kind of research that may be undertaken. Basic research, applied research, and research on educational problems may all have different effects on teaching.

A second consideration is that in order for research to have a beneficial influence on teaching, it is not necessary that either research quality or quantity be correlated with teaching quality. Instead, it is only necessary that the teaching quality of those engaged in both teaching and research be higher than it would be, were they only teaching. Thus, rather than comparing teaching quality of faculty in the dual role, future studies might compare the teaching of university teachers with that of full-time teachers at other institutions of higher education.

Finally, given the subtle interdependencies of research and teaching and the adherents to doctinaire positions for and against the present system of dual roles, great care is required in the presentation, interpretation, and discussion of the results of future studies. Offending the sensitiveness of defenders of the status quo might provoke unfortunate resistence to any improvements that might be indicated as a result of such studies.

A note of appreciation is extended to professor Robert Cope who wrote the U.S.O.E. grant proposal and assisted in the analysis.

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SEXUAL BIAS ANALYSIS IN HIGHER EDUCATION: AN APPRAISAL OF METHODOLOGY USEFUL TO INSTITUTIONAL RESEARCHERS

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Overview

We are now well acquainted with the legislative history of the "affirmative action" doctrine of 1967. Introduced in ridicule by prominent Dixicrats opposed to the 1964 Civil Rights Act, the doctrine took the form of Executive Order Number 11375 and stated in part that:

> . . . (A federal) contractor will not discriminate against any employee or applicant because of race, color, religion, sex, or national origin. The contractor will take affirmative action to ensure that employees are treated during employment, without regard to their race, color, religion, sex or national origin (Seabury, 1972, p. 39)

The Dixicrats who introduced the word "sex" to that Civil Rights Act as an amendment never really expected the above executive order to be issued. As one contemporary writer has stated, the afterthought amendment was offered primarily "to rouse . . . Northern masculine ire against the whole bill" (Seabury, 1972, p. 38).

A short time after the Executive Order was signed, however, the Department of Labor quickly offered further guidelines under Order Number Four which read, in part:

> . . . an acceptable affirmative action program must incude an analysis of areas within which the contractor is deficient in the utilization of minority groups and women" (Seabury, 1972, p. 39).

Thus, the above guideline became the first national directive issued by a federal agency to universities concerning sexual discrimination allegation procedures on campus.

It took little time for the Labor Department's directive to be cited by the Department of Health, Education and Welfare (HEW) as applicable to university hiring and remuneration practices. Executive Order 11375 quickly affected both public and private institutions of higher education. Columbia University and The University of Michigan obtained the unenviable distinction of being the first institutions of higher education where unacceptable affirmative action plans were defined by HEW authorities (Zwerdling, 1973).

Most institutional researchers realized that, long before the mandate of "affirmative action," universities have routinely reviewed their own hiring and remuneration practices. It is simply not good administrative practice to omit such analysis. Both faculty rapport and fiscal accounting practices rely heavily upon information secured through such studies.

With the HEW mandate, however, these routine institutional analyses emerged as a public as well as a private concern. Using Executive Order 11246, the Women's Equity Action League (WEAL) recently asked HEW to investigate alleged sexual discrimination throughout the State University Systems of Michigan, New York, California, Florida, and New Jersey. Under fire from the Contract Compliance division of HEW, the University of Michigan has recently written the nation's first affirmative action plan of equal sexual employment opportunities.

Other instances of anti-discrimination litigation and subsequent policy reorientation by colleges and universities could be cited. It is enough at this point to simply state that, regardless of how today's institutional researcher perceives his function, he is fast becoming the dejure anti-discrimination fact-finder for his university.

Statement of Purpose

Something is wrong when a sexual bias allegation is easier to specify than is a related documentation methodology. Yet this appears to be that state of affairs in many of today's universities. This paper will attempt to show that it is only when researchers have not had the opportunity to either define relevant stratifying variables on which hiring and remuneration practices are based, or when they attempt to use statistical analyses inappropriate to the decisions to be made that documentation becomes less efficient than the precipitating allegation.

Let us begin with an examination of existing quantitative methods applicable to discrimination studies, follow with recommended investigative procedures deemed useful to institutional researchers charged with related analyses on their campus, and end with an example of one service remuneration study successfully conducted at Youngstown State University (Youngstown, Ohio) during the Spring of 1972.

Review of Available Methodology

A reader performing a cursory review of existing literature will quickly find that few authors have written

specifically on the topic of higher education service remuneration policy and related post hoc analyses. Indeed, at the date of this writing, HEW itself has failed to prescribe quantitative methodology commensurate with their affirmative action guidelines.

Today's administrative researcher must rely on specific methods at once unique to his institution and acceptable to affirmative action officials outside his organization. Fortunately, an increased coherence of research focus and procedures are now beginning to be reported in the professional journals. Many reports appear, at first glance, to be so contextually distinct from each other that the degree of external applicability seems low. Closer inspection, however, reveals that contemporary analysis procedures have evolved within a three-stage refinement of technique. Let us look briefly at these evolutionary trends.

The quantitative theory of faculty selection and remuneration procedure analysis seems to have been refined through three stages. Initially only an elementary quota model was used. Subsequent refinements to date have included a second regression model and a third Bayesian or decision theory model.

The quota model applicable in selection analysis was understandibly refined during the mid-to-late sixties when American social conscience was most critical of minority oppression. Minority members were pictured as running a foot race with the majority. Track officials, noting that to stop the race, unshackle the American Blacks, then allow the runners to continue would still produce an unfair race providing the shackled runner with time to "catch up" before continuance of the contest.

With the acceptance of this analogy the quota model was tentatively accepted. Given this model it was a relatively simple matter for institutional researchers to define the presence or absence of selective racial or sexual bias by measuring the percent of qualifiable minority applicants who were hired and promoted within their institution. If the percentage approximated the body count of minority in the population of all potential qualified applicants, minority repression allegations could assuredly be dismissed.

It took little time for officials to discern the shortcomings of the quota model. It failed to define adequate expertise levels of potential candidates, and "tooling-up" the minority using majority guidelines was not as easy as some had anticipated. Articles questioning and belittling quota model use began to appear. On November 6, 1972, a Berkeley Department Chairman was quoted in a national news weekly as stating: "We really looked for a qualified woman, but we just couldn't find one" (Newsweek, November 6, 1972, p. 114). At approximately the same time, Governor Milton Shapp (Pennsylvania) directed his state agency managers to recruit, train and promote as many women and other minority members as they could that year, but not to interpret his directive as representing a quota system. Obviously, even politicians were realizing that quota alone was not good enough.

Other social critics voiced displeasure in quotas with selective training riders. Intellectuals of the Jewish faith emphasized that, since the Carnegie Commission on Higher Education had determined that Jews comprise nine percent of the faculty in the nation's population (as contrasted with three percent of the nation's population), the affirmative action doctrine based on quotas and selective training mandated that Jews stop running their own footraces until the more recently unshakled acquire identical training and proportional membership. With increasing frequency other critics voiced their opposition, and the quota model was quietly dismissed.

In its place emerged a second regression model, as typified by the studies of Loeb and Ferber (1971) and Astin and Bayer (1972). Multiple linear regression seemed, at first glance, to be better suited to faculty selection and remuneration bias analysis than quota analysis. It necessarily included indices of expertise which the simpler quota model failed to define, and it directly related the indices to accepted competency criteria.

The multiple regression equations were based upon an extension of bivariate linear analysis which produces prediction equations of the form:

$$\hat{Y} = \overline{Y} + b(X-\overline{X})$$

Where $\hat{Y}$ = predicted salary of candidate Y_i for his expertise level

b = regression coefficient of Y on X produced by differentiating with respect to X and setting it equal to zero.

$\overline{X}$ = arithmetic mean of the X distribution

In multiple linear regression, more than one predictor (X) may be used to estimate the value of the criterion (Y). If Y_i denotes salary remuneration of t individuals and X_{ti} represents a value of the i^{th} expertise predictor (e.g., years of service in the profession, terminal degree, number of publications, etc.) for the t^{th} individual faculty member, the partial linear regression equation useful for obtaining the weighted sum of $\hat{Y}_i$ is:

$$\hat{Y}_i = a_0 + b_1X_{1i} + b_kX_{ki}$$

where $\hat{Y}_i$ = is a predicted placement within a rank order candidate list or an existing faculty member's predicted salary

In the above equation, a_0 is a constant, and the b's ($b_1 \ldots b_k$) are defined as partial regression coefficients and are also constants. If the b's are reduced to standard scores so that comparisons across expertise areas can be made, the resultant standard measure (β's) are known as standard partial regression coefficients. They are useful to administrative researchers in that they are independent of original predictor units and may be used as an index of comparative weights each expertise predictor contributes to the predictive power of the equation. When using the β's properly, the researcher defines the variance of a composite of n weighted predictors as:

$$\sigma_{wp} = \Sigma \beta_i^2 + 2\Sigma r_{ij} \beta_i \beta_j$$

where σ_{wp} = variance of a sum of n weighted predictors

β_i = standard partial regression coefficient of the i^{th} predictor

where r_{ij} = correlation between X_i and any other variable X_j where $j > i$

β_j = standard partial regression coefficient of the j^{th} predictor, with $j > i$

Usually a multiple regression analysis produces a multiple coefficient of correlation ($R_{1.2 \ldots k}$), which is derived in the analysis simultaneously with β_i and b_i generations. Like all product-moment correlation coefficients, R indicates the extent of relationship between two interval or better measures linearly related. In salary studies, it becomes the correlation between salary and the total collective of stratified predictor variables consisting of the weighted sum of score generated in the β and b determinations. In geometric terms, R is the slope of the least squares line of best fit connecting these two variables of supposedly equal variability. The obtained R is always a maximum value when the regression weights have been correctly defined. The terminal product of multiple linear regression analysis usually consists of a multiple correlation coefficient and prediction equation such as:

$$\hat{Y} = 9600 + 200X_1 + 10X_2 + 10X_3 + 500X_4$$

In this ficticious example, if Y represented average salary of a predefined population and $X_1 \ldots X_4$ represented predictors properly represented by an interval scale and of approximately equal variability, the researcher could properly state that every unit increase in X_1 (e.g., number of publications) is associated with a salary increase of $200.

As in the case of bivariate linear regression, the above prediction equation has an associated standard error of estimate and related variance partitioning procedures useful in establishing confidence intervals and checking the assumption that the relation investigated is truly linear.

As noted earlier, studies by Loeb and Ferber (1971), and Astin and Bayer (1972) used multiple regression analysis to investigate allegations of sexual discrimination. Loeb and Ferber's technique involved a proportioning of variance prior to regression analysis, while Astin and Bayer employed a stepwise multiple regression analysis directly on a multitude of expertise variables. Both of these studies are worth reading. Care, however, should be taken by the reader in interpreting some results. Researchers acquainted with basic linear regression using least squares criterion and the general linear hypothesis techniques developed by Bottenberg and Ward (1963), will quickly see unwarranted data assumptions in both publications.

Assuming for the moment that their assumptions were justified, Loeb and Ferber reasoned that sexual discrimination existed if the sex variable itself added significantly to the predictability of salary after average match salaries have been used within the multiple regression analysis. They performed a sample survey, then matched faculty by department, rank, publications, degree, and academic honors. A routine regression analysis was performed using independent predictors, then a stepwise multiple regression was attempted using sex-by-predictor indices. The two interactive indices of strongest predictive power were found to be sex-by-merit and sex-by-experience. The authors were able to conclude after their investigation that:

> Papers read at meetings, honors, and if sex is known, bulletins and technical reports, and years spent at the University of Illinois at the current rank are significant predictors of salary (Loeb and Ferber, 1971, p. 243).

The authors then attempted to place dollar amounts on the degree of sexual discrimination, but found they could only use nonstandardized regression weight ratios to define the "average yearly dollar value of masculinity" (Loeb and Ferber, 1971, p. 246). In the authors own words, "the data (did) not clearly allow estimation of the magnitude of the discrepancies between the sexes" (Loeb and Ferber, 1971, p. 243).

The Astin and Bayer investigation concentrated on three criterion variables (academic rank, tenure status, and salary) and four sets of predictor variables (demographic, education, professional/work activities and employing institution). Analytic procedures consisted of routine stepwise multiple linear regression, as cited in standard texts. The authors used a total of 33 predictors of salary and found that "64 percent of the variance in salary (was) explained on the basis of the 33 . . . variables" (Astin and Bayer, 1972, p. 108). Another finding deemed significant by

the authors was that:

> The three most important variables in explaining salary differentials were rank, productivity and type of parent institution (Astin and Bayer, 1972, p. 108).

Significant predictors of academic rank were found to be the doctorate, years in academe, and publications for both men and women. In considering rank as well as salary, Astin and Bayer added an additional demension to their analysis with no appreciable change in analytic procedure.

Like Loeb and Ferber, Astin and Bayer's concluding statements could only deal with such topics as explained variance between the sexes and significant predictors of promotion and salary within each sex. These types of statements obviously help discern if discrimination exists within a faculty group, but they do not allow an individualized study of faculty commensurate with individual faculty discrimination allegations.

There are other disadvantages to using the multiple regression approach besides the inappropriate indices generated. The technique always requires that, when alleged bias between two groups is studied, the predictor variables chosen be complete in their definition of pre-existing group differences (Lord, 1967), have perfect predictor reliability (Linn and Werts, 1971), and be themselves unbiased measures of accomplishment (Thorndike, 1971). In the opinion of Thorndike, all of the three qualifications are usually substandard when used in remuneration and placement analysis (Thorndike, 1971). Add to these qualifications the inflation problems associated with using many predictors to artificially raise a multiple R and the technique becomes even more questionable.

In summary, there is considerable evidence to suggest that the multiple regression approach is inappropriate for an institutional analysis of alleged sexual discrimination. With reference to faculty salaries and promotion analysis, it is not specific to members within the group, it has a built-in bias when many predictors are used to generate the multiple R's, the categores within the predictor variables themselves are often not orthogonal, and the indices produced are not readily understood by the average affirmative action official.

Concerning hiring practices, the fact that many administrators use predefined, multiple cutoff strategies in screening applicants further prohibits the use of the multiple regression general agreement that outstanding candidates possess areas of expertise for which there is no substitute. Candidates below minimum competencies in one criterion area are not generally defined as assets to a college, even if they are superior in other areas specified as predictors in the multiple linear regression equation.

Screening Committee members who eliminate candidates lacking essential skills intuitively reject multiple R rationale. In eliminating the applications of individuals who lack one or more essential skills or experience qualification normally included as predictors of successful accomplishments in academe, administrators reject the foundation of regression analysis (the selection of candidates with the highest level of summative qualifications who may compensate on expertise credentials with exceptional skills or experience in other cognates) (Anastasi, 1968).

The best alternative approach for quantifying institutional selection and remuneration of faculty appears to be a tool researchers have had for a long time, elementary Bayesian and cross-tabulation analysis. The American College Testing Program's Research and Development Division, under the direction of Melvin Novick, is currently the most knowledgeable authority on Bayesian techniques as applied to selection procedures. It appears that simple, computer-assisted cross-tabulation of salary and promotional remuneration based upon accepted expertise variables is the best technique for documentation in response to discrimination allegations. Two references recommended for review of such methods are (1) *Bias in Selection* (Cole, 1972), and *Statistical Package for the Social Sciences* (SPSS) (Nie, Bent and Hull, 1970).

Cole's research report first introduces the reader to basic Bayesian considerations, then guides him through a brief history of selection analysis as interpreted through Bayesian theory. The analytic models considered, in order of complexity, include the quota and regression models previously discussed in this paper plus the Darlington model. The SPSS manual is an extremely powerful computer software package that is readily adaptable to institutional research work.

All models discussed by Cole allow the researcher to use quantifiable "priors" of his institution to predict changes of selection for candidates with predefined expertise levels of competence. Although the bulletin is written specifically for admissions officers who wish to insure equal opportunity of selection based upon achievement scores, it does provide a rationale useful for institutional researchers. If a university has available a campus-wide format for screening applicants, many ideas within the bulletin can be used directly.

If screening procedures are less formal, one may still use Bayesian techniques to investigate alleged discriminatory hiring practices. The only requirement is that the number of potential applicants for a position and related existing conditions of current faculty of similar position are known. For example, suppose that there is available a file or document which defines the proportion of female to male candidates graduating with appropriate credentials in the field of English. Let's arbitrarily state that this propor-

tion is .35 to .65 for females to males, respectively.

Denoting males by M and females by F for a random candidate, the probabilities associated with each sex may then be assumed to be:

$$P\{M\} = .65$$

$$P\{F\} = .35$$

Next, suppose that D represents an instance of a discrimination allegation against an institution. If that institution can, through a breakdown and cross-tabulation of qualifications, salary, and promotions of current faculty, determine an index of discrimination, judgements of progress toward anti-discriminatory practices can be attempted. From the index, the percent of M and F expected to be discriminated against if current policy continues can be derived, and a conditional probability statement can be defined.

Suppose, for instance, that previous statistical breakdown analysis indicates a mean difference of $1500 between M and F English faculty after all relevent variables of remuneration have been controlled. Further statistical cross-tabulation analysis indicates that 75 percent of the females and 25 percent of the males were discriminated against, as defined by such salary differentials. In terms of conditional probabilities

$$P\{D|F\} = .75$$

$$P\{D|M\} = .25$$

According to Bayes theorem, the probability that a female candidate will be hired if interviewed (that is not discriminated against when credentials are identical to male applicants) is:

$$P\{F|D\} = \frac{P\{D|F\}\ P\{F\}}{P\{D|F\}\ P\{F\} + P\{D|M\}\ P\{M\}}$$

$$= \frac{(.75)\ (.35)}{(.75)\ (.35) + (.25)\ (.65)}$$

$$= (.262) / \{(.262) + (.162)\}$$

$$= .111$$

Without prior information of the extent of existing descrimination within the English Department, it would be assumed that the probability of a female being hired is .35. With selected "priors," however, expectation of the female candidate is considerably reduced.

Once a university has adequately analyzed existing promotion and salary indices, and have systematically reviewed and defined criteria of placement and promotion, the institutional researcher should have little trouble using either the Bayesian or routine cross-tabulation procedures. There are only two restrictions associated with these types of analyses. The first is that all relevant criteria on all faculty must be known. The second is that only the most relevant and discriminating indices (between the sexes) must be used in initial cross-tabulation work. Concerning the latter restriction, the number of variables used in alleged discrimination cases generally should not be greater than four. If this number is exceeded, it is likely that the number of empty cells in the initial tabulation matrix will prohibit further investigations. Pragmatically, it is difficult to discuss individual competencies with more than this number of qualifiers, and analytic procedures usually emphasize the limitation of such conversions.

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BIAS IN FACULTY REPORTS OF TIME AND EFFORT EXPENDITURE

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This paper is an extract from a detailed exploratory study into the bias associated with faculty self-reporting of time and effort. The parent study contains a substantial amount of statistical material not included here. It is the purpose of this paper to present a general discussion of the subject and leave the technical material to those who may wish to pursue it.[1] This paper, then, delves into the question of whether there is bias in faculty reports of time and effort and whether there is a pattern to any such bias.

Background

In order to put this report into perspective, let us review the circumstances which led to its preparation. In January, 1971, this writer was directed to determine how faculty members at the Florida State University divide their time among specified categories of academic activity. The purpose of the project was twofold: First, it was to provide information for impending legislative hearings and second, it was needed to produce baseline information for the upcoming program budget and six-year plan.

A brief review of literature in the educational field revealed that although there were many studies on faculty time and effort, no substantive studies had been performed on the subject of *survey methods* for faculty time/effort reporting. With the absence of such research, an attempt was made to determine how other universities were obtaining information on faculty effort distribution. Letters were sent to the directors of institutional research of the forty United States universities larger than Florida State University, those forty offering the largest number of doctoral degrees in academic year 1969-70.

These letters asked for information on how each university went about obtaining information on its faculty's division of effort. Of the forty schools polled, thirty replied. Of that number, 16 required a faculty questionnaire, 5 obtained the information from department chairmen, and 9 made no attempt to obtain the information.

The results of the poll indicated that a mail questionnaire was the common method of obtaining faculty time/effort information. These results led to a decision to utilize a questionnaire instrument to determine how the faculty at the Florida State University divided its effort among selected activities. This writer then constructed an instrument that requested faculty information required by the university. This instrument utilized the best concepts and approaches of each questionnaire received from the other universities. The resulting questionnaire was distributed directly to each faculty member having a half-time or greater appointment.

The writer then conducted faculty briefings and institutional meetings campus-wide on how to complete the questionnaire. The reaction to the questionnaire itself, the faculty concepts of the reasons for it, their apprehensions about the uses or the misuses of the data, and their view of the process as a threat impinging upon academic freedom were revealed as real forces at work among the faculty. These factors were seen to be significant and unavoidable forces impinging upon the reporting process.

Given these attitudes of fear and apprehension on the part of many faculty members, this researcher began to doubt whether it is possible to obtain accurate and unbiased information on faculty activities through use of a questionnaire instrument. In other words, it was felt that it would not be possible to accurately measure output of the faculty resource.

Contributing thoughts

In a paper presented to the American Council on Education's 1959 Conference on Faculty Workload, Dr. Theodore Caplow recognized that there are an infinite number of ways to measure faculty load, but all of these pose problems. The first problem, he felt, is that there will be cheating when faculty load is measured by an administrative office. That this is so is not disreputable. It is a matter of general observation that whenever worker output is measured by employers there is some misrepresentation unless extreme (and in this case, Caplow felt, inappropriate) care is taken to verify the figures.[2]

In commenting on the deviltries of faculty load studies, Reeves and Russell made the following comment that provides an excellent summation of the situation.

> The evaluation of faculty load is an extremely difficult problem. Teaching duties and other professional duties vary tremendously from institution to institution and individual to individual within the given institution. In fact, the factors involved in determin-

ing total faculty load are so numerous and so varied as almost to preclude precise determination by any mechanical method. No thoroughly scientific method of measuring faculty load is now available. Existing measures are unsatisfactory and incomplete. The answers are not yet in. Yet, as a practical necessity, some method of measuring and adjusting faculty load — even though approximate — must be employed.[3]

While measurement of faculty output has been a consistent and continual problem in higher education for a number of years, there are no significant difficulties with measuring the output of processes which are easily quantified. Assembly lines producing automobile parts, electric components, 6-packs of Coca Cola, or cartons of cigarettes present no conceptual measurement challenges. Engineers have been ingenious in devising methods of measuring, weighing, and otherwise assigning numerical values to the outputs of such operational processes.

On the other hand, wherever an output or operational result involves the human resource, measurement becomes more challenging. The Hawthorne experiments gave evidence of this phenomenon.[4] Under varying operating conditions worker output increased regardless of the changing physical environments devised by the experimenters. It was determined that the presence of outsiders (the experimenters) was itself affecting the performance of the workers. Studies since then have determined that either the presence of observers or the knowledge that performance is being measured may have an inpact on the amount and type of action taken by the person being measured.

Hypotheses

In developing the methodology to attack the problem of examining whether (and to what degree) there is bias in reporting time/effort through the use of questionnaires, the following questions (hypotheses) were proposed:

1. Is there any significant bias in reporting faculty time/effort on questionnaires?
2. Is there any significant difference in reporting bias between academic ranks?
3. Is there any significant difference in reporting bias between academic disciplines?

Methodology

With no existing studies to use as a baseline or point of departure, the research techniques described herein are exploratory in nature. That is, they attempt to determine the presence and pattern of occurrence of any bias in reporting on self-completion type questionnaires.

An ideal approach to this kind of problem of determining bias would be to compare measured responses to known values. Since the known values did not exist, other procedures were needed.

As an alternate methodology to the above, the following was decided to be a satisfactory substitute. *Truer* values than those available through the questionnaires were used in place of the absolute known values. These *truer* values were obtained through use of another measuring instrument more accurate than the questionnaire.

A careful review of the literature revealed that a diary instrument, *when used under carefully controlled circumstances*, will provide more accurate information on time/effort than will a questionnaire.[4]

It was therefore decided that the test instrument to be used to provide an alternate source of information on faculty time/effort would be a diary log sheet. Faculty estimates of time/effort were gathered using both questionnaire and diary instruments. In the case of the questionnaire, faculty were asked to estimate their activities for an average week during the academic quarter. The diary instrument, on the other hand, was administered over the course of the quarter such that each respondent completed a diary on each of fourteen days, selected by a computer random number generator. For selected activities, the algebraic difference between questionnaire and diary estimates of a week's activities was obtained. This difference represented a measure of the bias in the questionnaire responses.

Bias, a term used throughout this paper, is a synonum fer noise, anomaly, delay, or difference. The word "bias" carries with it no connotation of either goodness or badness. It has no connection with statistical bias. It is the difference between the real amount of time/effort devoted to certain activities and the apparent amount of time/effort devoted to those activities as reported through the information channel.

Thus, the algebraic difference between a sample respondent's diary results and the questionnaire's reported norm for that cell represented the difference between the individual's actual activity and the estimated activity for individuals of that cell. The assumption was made that this difference represented a measure of bias and not the bias itself. Due to a lack of any previous developed technique for determining bias, this researcher felt justified in using the above measure. Further, it was hoped that the exploratory nature of this research provided sufficient license for experimentation.

In view of the foregoing, a sample of faculty diaries was obtained in such a way that it could be used for two types of tests: First, to determine whether the diary data were significantly different from the questionnaire data, and second, to determine if it might be possible to detect significant differences in bias between academic ranks or academic disciplines.

As for the activities to be measured, the original questionnaire contained a number of candidates. Selecting the particular values to be studied from this list of candi-

dates required the development of a set of selection criteria.

A first consideration was that the value (or parameter) should be clearly defined and not easily misunderstood. A second criterion for selection of parameters was that they should be common to all faculty.

In order to meet the criteria of being easily understood and easily quantified, activities were defined in such a way as to be consistent with the faculty's perception of the task. Measuring activities in the category "academic support" would not be desirable since this represents a set of activities grouped for budgetary convenience and not a set of task performed by a faculty member. Therefore, a professor might not find it easy to perceive, and hence be unable to correctly quantify his "academic support" activities.

It was therefore decided to measure *instructional activities* using both the questionnaire and the diary. The activities measured and compared were: classroom teaching activities, individual instruction activities, and academic advising.

Forty-eight faculty members were selected using random procedures within twelve pre-selected strata. These strata or cells were arranged to include faculty from all instructional departments. These departments were divided into four academic discipline groupings:

1. Professional Schools
2. Social Sciences
3. Physical and Quantitative Sciences
4. Arts and Letters

Within each discipline grouping four faculty of each rank were selected. An application of statistical processes to the data gathered from these people allowed for the exploration of bias and its differences between ranks and between disciplines.

For each of the forty-eight faculty members participating in the study, diary data were obtained for no less than fourteen days during the Spring Quarter of academic year 1970-71. For each respondent seven sample days were obtained during the first five weeks of the quarter and seven more sample days from the last five weeks. Each of the two seven-day periods or sample weeks for a respondent contained one Sunday, one Monday, etc., such that each day of the week was represented.

As each diary sheet was received back from a participant, it was checked and the data placed onto computer cards. When all diaries were returned and the data punched, the statistical comparisons began. The average number of hours per week expended in each category as reported on the diary was algebraically compared with the similar values reported on the questionnaire. The questionnaire estimates were made for an "average" week as defined by the individual faculty member. The differences between the two, called bias here, were subsequently operated upon statistically.

Findings

The first question to be answered by this research was whether there was any statistically significant bias present. A simple Student's "t" test was used to make this determination. The results of this test showed bias to be present in all three categories of instructional activity. In all cases the questionnaire estimates exceeded the diary tabulations, thus indicating an upward bias in the estimation of time expenditure on the questionnaire.

In order to respond to the questions or hypotheses concerning the detection of *differences* in bias between ranks or disciplines, a two-way blocking design analysis of variance (ANOVA) model was used. In this model individual bias were considered to be the experimental units, academic disciplines were the blocks, and academic ranks represented the treatments. This procedure yielded a four block by three treatment (or twelve cell) segmentation of the population.

Use of this model revealed no differences in bias between the three academic ranks of professor, associate professor, and assistant professor for any of the three categories of activity. That is to say, that although bias factors existed for each rank, there were no statistically significant differences in bias between ranks.

When testing for differences between disciplines, however, there were statistically significant differences found in the activity category called classroom instruction. The levels of bias were as shown in Figure 1, and the statistical tests were as shown in figure 2.

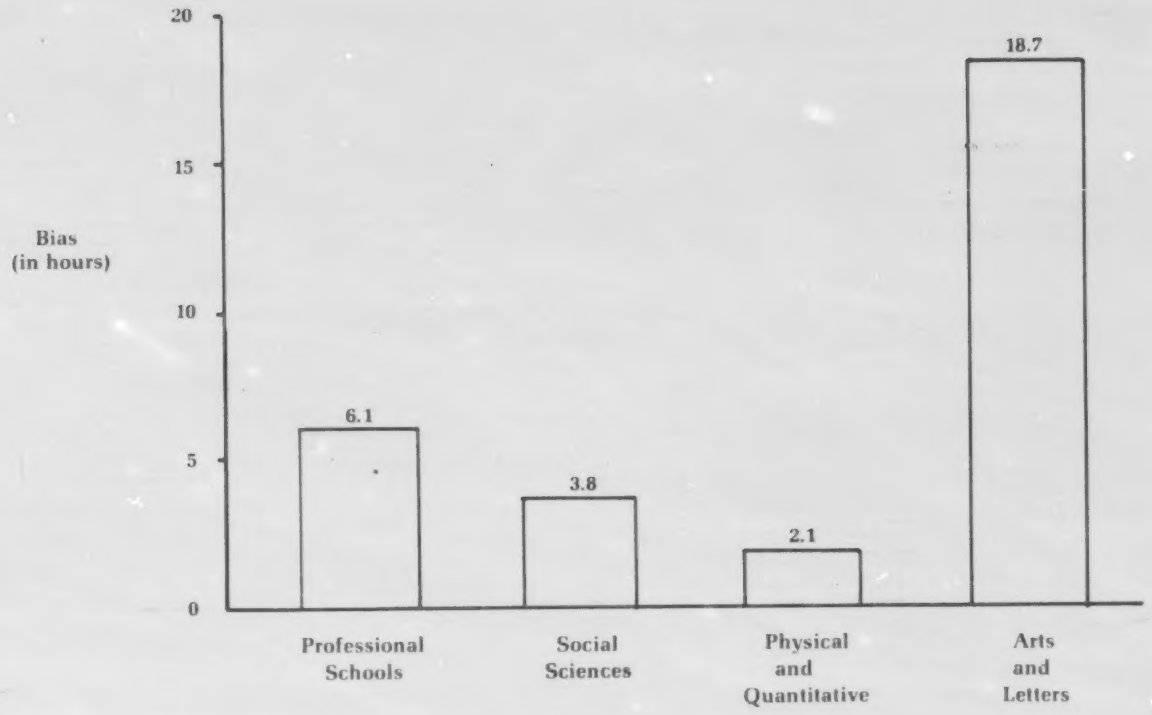
Conclusions

The findings of this research lead one inexorably to certain conclusions. The first of these is that where a questionnaire instrument is used to obtain self-reported estimates of time and effort expenditure, there is a distinct possibility that bias will be found in the responses.

The second conclusion is that wherever accurate estimates of time/effort are needed through self-reporting instruments, a diary should be used in lieu of a questionnaire. The results of *this* study demonstrate the virtues of the diary where accuracy of data is a prime consideration. Diaries require respondents to write down their activities as they occur. No reliance need be placed upon memory or upon one's ability to estimate average time expenditure. Thus, a diary is an ex post documentation of events that have occurred, while a questionnaire typically requests estimates of past, present, or future events.

The third conclusion concerns the existence of bias among groups of respondents. This study has shown that people differ in their tendency to bias questionnaire responses. The differences between individual biases were expected, whereas the differences in group bias were not. The large difference between the bias reported by Arts and Letters discipline and the other three disciplines is ample

Figure 1
COMPARISONS OF LEVELS OF BIAS



evidence that groups of respondents can collectively, and without apparent collusion, bias questionnaire inputs in the same direction and to the same degree.

A fourth conclusion may be drawn concerning the composition of bias. Bias, as used in this research, is the algebraic difference between diary values and questionnaire values. Given this mathematical definition, one must carefully question the factors that make up the bias. The existence of both accurate and inaccurate estimates of time expenditure on the questionnaire lead one to believe that there are two major components to bias. The first of these is the ability, or inability, of the individual to estimate time expenditure. The second component, independent of one's estimating ability, concerns the existence of a conscious effort to alter these estimates once they have been made.

Implications

This study should be of interest to administrators and managers who contemplate the use of self-completion instruments to obtain time/effort expenditure data from employees. Although it is clear that bias can exist in data obtained through questionnaires, it should be equally clear that it can occur on diaries or any other self-reporting instrument. The nature of the diary technique is such, however, that it takes a more deliberate and consistent effort on the part of a respondent to bias a series of diaries. Thus, although one cannot expect to find bias completely absent in diary-produced data, one can expect to find its presence minimized.

Administrators should also be aware of the trade-off between the need for accurate information and the cost of obtaining it. A carefully controlled diary census of all faculty would provide the most reliable estimate of faculty activity that is possible using self-completion devices.

This procedure is quite costly to carry out. The costs associated with planning for such a project, printing costs for thousands of diary sheets, the expense of envelopes for mailing, the cost of mailing (either in postage or increased work force for campus mail), the personnel needed for processing completed diaries and tracking down

Figure 2
TEST OF HYPOTHESIS

1. **Null Hypothesis:**

   There is no significant difference that can be assignable to differences in academic disciplines between the mean number of hours reported in selected categories of activity on the questionnaire when compared to similar activities reported on the diary.

2. **Test Statistic:**

   An ANOVA model and an F test where $df_1 = 4$ and $df_2 = 36$

3. **Boundaries for the region of acceptance:**

   a. For $p = .01$ $F_{3/36} = 4.38$
   b. For $p = .05$ $F_{3/36} = 2.86$
   c. For $p = .10$ $F_{3/36} = 2.25$

4. **Results of calculation of the F statistic:**

   a. Classroom Instruction: 6.6077*
   b. Individual Instruction: 2.1561
   c. Advising: 1.3419

   * statistically significant

5. **Implications of the results:**

   a. In the activity Classroom Instruction one can reject the null hypothesis at the $P = .01, .05,$ and .10 levels.
   b. In all other activity categories one may not reject the null hypothesis based upon this evidence but must reserve judgment.

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missing diaries, and finally, the computer costs for tabulation and analysis; sum up to a large dollar amount.

At some small sacrifice in accuracy but at considerable saving in dollar expenditures, one might conduct a diary study involving a carefully selected sample of faculty, rather than a census of faculty. At even less cost and with lesser precision of results, one might consider using a questionnaire census (or sample) of faculty.

For most applications it is neither necessary nor desirable to incur the costs associated with obtaining precise estimates of employee time/effort expenditure. If one is willing to accept the bias likely to occur in questionnaire-gathered estimates of time/effort expenditure, then the precision versus cost decision should be an easy one to make.

Quite simply, with decreasing requirements for accuracy, concomitant cost reductions can be realized.

In closing I would like to share with you the thoughts of a pioneer in the field of institutional research, Hugh Stickler. The following comment from his 1959 classic paper on faculty load studies provides an excellent summary for this paper:

> From the various studies to which reference has been made in this paper . . . 'total workload cannot simply be described or easily measured. Literature to date is confusing, fragmentary, and inadequate. Findings are frequently conflicting and/or inconclusive. Relatively little real progress has been made in developing adequate techniques for the measurement of total faculty loads' . . . That was the attitude when Reeves and Russell described it in 1929; it is still the situation thirty years later in 1959.[5]

And what of 1974?

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[1]For more on this topic see: Patrick H. Sullivan, "An Analysis of Selected Techniques for Reporting of Time/Effort for Management and Control" (unpublished dissertation, Florida State University, 1972).

[2]Theodore Caplos, "The Dynamics of Faculty Load Studies," in *Faculty World Load*, ed. by Kevin Bnell (Washington, D.C.: American Council on Education, 1960), p. 69.

[3]F.W. Reeves and J.D. Russell, "Instructional Loads," *College Organization and Administration* (Indianapolis, Ind.: Board of Education, Disciples of Christ, 1929), pp. 165-182.

[4]Several papers should be devoted to this key point alone. The question of diary versus questionnaire, et. al., as it relates to this research is addressed in Sullivan, "An analysis of Selected Techniques for Reporting of Time/Effort for Management and Control."

[5]W. Hugh Stickler, "Working Material and Bibliography on Faculty Load," in *Faculty Work Load*, ed. by Kevin Bunnell, p. 84 citing M.E. Haggerty, *The Evaluation of Higher Institutions* (Chicago, Ill.: University of Chicago Press, 1937), pp. 144-56.

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DETERMINING FACULTY ATTITUDES TOWARD COLLECTIVE BARGAINING USING PATH ANALYSIS

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There has been a great deal of material published since 1968 concerning collective bargaining in higher education. However, the majority of this literature has been philosophical or legalistic in nature, unsupported by empirical data. A review of the empirical research concerning collective bargaining in education revealed less than a dozen reported studies, none of which sought to analyze faculty attitudes toward collective bargaining in a four-year college or university.

Despite the paucity of empirical research studies, the few reported have already investigated the relationship between collective bargaining attitudes and a wide variety of demographic and career variables. While most of these variables were significantly related to collective bargaining attitudes, the uniform weakness of the reported relationships was noteworthy. One implication suggested by these findings is that collective bargaining attitudes are broader in scope than mere demographic variables would indicate. Stronger relationships might therefore be obtained by the identification of a variable reflective of a broader attitudinal framework.

Levine (1965), in a study of educational viewpoints of selected suburban residents, found that a significant relationship existed between liberal-conservatism on social and economic issues, and views on education. In a similar study of the selected public school teachers by Caliguri and Levine (1967), it was found that the relationship between liberal-conservatism and educational viewpoint was strong enough to withstand the homogenizing effect of professional training. One implication of these findings is that:

> . . . attitudes toward education are so embedded in a broader attitudinal framework that knowledge of an individual's general orientation toward government and society offers some predictive power concerning his reaction to specific educational policies.

If one assumes collective bargaining, like education, is closely associated with governmental activity, then many of the attitudes associated with collective bargaining in higher education may center upon questions with broad social and economic implications. Therefore, faculty member's liberal-conservative orientation toward government and society should be related to his collective bargaining attitudes.

Knowledge of the relationship between a faculty member's liberal-conservativism and his attitudes toward collective bargaining should provide some insight into the general formation of those attitudes. There is little, however, that either the faculty or administration could do in response to this knowledge to alter faculty action. Thus, identification of a determinant over which the affected parties have some control, such as the extent of shared authority seems desirable.

As early as 1967, the American Association for Higher Education (AAHE) was concerned with faculty discontent and the potential impact of collective bargaining on campus goverance. As part of that concern they published *Faculty Participation in Academic Governance* (1967), a report of the task force on faculty representation and academic negotiations, campus governance program. That report, in part, found that an effective system of campus governance should be built on the concept of authority shared by the faculty and administration. Further, it found that shared authority can best be implemented through the establishment of internal organizations and that formal bargaining relationships are most likely to develop when such organizations are not provided and supported.

In 1971 the AAHE published *Shared Authority on Campus*, another report of the campus governance program. This report, in essence, proposed a reconsideration of authority relationships with a view to a more effective hearing for students, faculty, and other inadequately heeded campus constituencies.

Other authors have also suggested the importance of an increase in shared authority. William Boyd, President of Central Michigan University, suggests that unionization results from a ". . . search for new means of asserting professional power in areas where faculty tend to be losing to outside forces." Similarly, Sheila Polishok (1970), of the City University of New York, noted that:

> As they probably are elsewhere, the realities of power were at the center of the movement toward collective bargaining at the City University. Not unlike American skilled workers in the early nineteenth century, most faculty members were convinced that their professional existence could no longer be protected by

individual initiative.

If faculty discontent is related, at least in part, to a lack of meaningful faculty participation in campus governance, then a measure of the perception of faculty participation in governance should relate to collective bargaining attitudes.

Previous research reporting significant, although weak, relationships between collective bargaining attitude and demographic characteristic made it desirable to continue this area of investigation. Because of the low correlations previously reported, only the basic demographic characteristics of age, sex, rank and tenure status were included. The economic emphasis of collective bargaining suggested the need to measure faculty members' perception of the adequacy of the academic salary scale at their institution. Recent activities of the major professional organizations — AFT, NSP, AAUP — in the area of collective bargaining suggested the desirability of collective information concerning faculty membership in these organizations.

Procedure

A research questionnaire was designed to collect information about basic faculty characteristics — age, rank, sex, tenure status, salary perception, organization membership — together with previously developed scales to measure faculty attitudes toward collective bargaining (Moore, 1970), their liberal-conservativism (Levine, 1965), and perception of shared authority (Morgan, 1971).

The collective bargaining scale was adapted from a scale utilized by Moore (1970) in his study of Pennsylvania Community College faculty. Moore's scale consisted of thirty opinion statements concerning collective bargaining, sanctions and strikes in higher education. The only modification of his scale was the substitution of collective bargaining for "collective negotiation" throughout the scale.

The liberal-conservatism scale was originally developed by Levine in a study of its correspondence to educational viewpoints (1965). The scale consisted of two parts, each with ten items, to measure liberal-conservatism on social and economic issues. This scale was used without modification.

The scale used for the measurement of faculty perception of shared authority was adapted from one developed by Morgan (1971). In his exploratory study of the "Measurement of Decentralization in University Organizations," the author had faculty members rate the order of importance of twenty-six select decisions. Subsequently, these decisions were rated by faculty using a 5-item Likert-type format graduated to show increased sub-unit control. The only modification of the Morgan scale was the deletion of eleven of the original twenty-six decisions to more appropriately reflect decisions associated with the sub-unit selected for this study.

Analysis of the Data

The research questionnaire was distributed to all full-time faculty members at The Florida State University. A total of 433 answer sheets, 39.36 percent, were usable. An analysis of the distribution of the sample, according to basic demographic characteristics, indicated an extremely close fit to the population with no significant deviations.

Liberal-Conservatism

In order to determine the linear relationship between scores on the liberal-conservatism and collective bargaining scales, a Pearson product-moment correlation coefficient was computed. The correlation coefficient was equal to -.56, which was statistically significant at the .05 level ($p < .001$). The Power of this test for a medium effect size ($r = .30$) was greater than .995. Thus the inference can be made that a linear relationship exists between faculty liberalism and positive collective bargaining attitudes.

Refinement of a linear relationship of these two variables was accomplished by dividing the sample into subgroups according to the selected faculty characteristics. Each subgroup — rank, age, sex, tenure status, salary perception, organizational membership — was further subdivided into classes.

Pearson product-moment correlation coefficients were computed, for each class within the subgroups. The correlation coefficient of each class together with a test of significance is presented in Table 1. The results (Table 1) indicate that the correlation coefficients for all classes except two were significant at the .001 level. The class for faculty over 60 years of age was significant at the .05 level and the class for AFT membership was not significant at the level selected (.05). Correlation coefficients substantially greater than for the entire sample ($r = -.56$) were noted for assistant professors ($r = -.62$), instructors ($r = -.72$), faculty age 30-39 years ($r = -.61$), females ($r = -.63$) and nontenured faculty ($r = -.62$). Substantially lower correlation coefficients were associated with AFT membership ($r = -.11$), AAUP membership ($r = -.40$), tenured faculty ($r = -.47$), professors ($r = -.41$) and faculty over age 60 ($r = -.36$).

The comparison of correlation coefficients between classes within each subgroup indicated five significant differences (.05 level). The correlation between liberal-conservatism and collective bargaining was significantly lower for AFT members ($r = -.11$) and AAUP members ($r = -.40$) than faculty indicating no organizational membership, (i.e., AFT, NSP, AAUP), ($r = -.59$). Non-tenured faculty ($r = -.62$) indicated a significantly higher correlation than did the tenured faculty ($r = -.47$). Two additional significant differences were indicated in comparisons associated with faculty rank. Professors ($r = -.41$) had a significantly lower correlation than did either instructors ($r = -.72$) or assistant

Table 1

PEARSON PRODUCT-MOMENT CORRELATION COEFFICIENTS FOR FACULTY SCORES ON LIBERAL-CONSERVATISM AND COLLECTIVE BARGAINING SCALE BY SAMPLE SUBGROUP

Subgroup	Class	N	r
Rank	Professor	136	-.41***
	Associate Professor	102	-.55***
	Assistant Professor	157	-.62***
	Instructor	27	-.72***
Age	Under 30	61	-.57***
	31-39 Years	133	-.61***
	40-49 Years	107	-.52***
	50-59 Years	95	-.55***
	Over 60 Years	37	-.36*
Sex	Male	356	-.54***
	Female	76	-.63***
Salary Perception	Below Average	217	-.58***
	Average	153	-.61***
	Above Average	49	-.55***
Tenure Status	Not Tenured	234	-.62***
	Tenured	191	-.47***
Membership	AFT	32	
	AAUP	135	-.40***
	None	258	-.53***

* Significant at the .05 level.

*** Significant at the .001 level.

professors (r= -.62).

Shared Authority

In order to determine the linear relationship between scores on the shared authority and collective bargaining scales, a Pearson product-moment correlation coefficient was computed. The correlation coefficient was equal to -.41, which was statistically significant at the .05 level ($p < .01$). The power of this test for a medium effect size (r= -.30) was greater than .995. Thus the inference can be made that some relationship exists between low faculty perception of shared authority and favorable collective bargaining attitudes.

Refinement of the linear relationship of these two variables was accomplished by dividing the sample into subgroups according to the selected faculty characteristics. Each subgroup — rank, age, sex, tenure status, salary perception, membership — was further divided into classes.

Pearson product-moment correlation coefficients were computed, for each class within the subgroups. The

Table 2

PEARSON PRODUCT-MOMENT CORRELATION COEFFICIENTS FOR FACULTY SCORES ON SHARED AUTHORITY AND COLLECTIVE BARGAINING SCALE BY SAMPLE SUBGROUPS

Subgroup	Class	N	r
Rank	Professor	136	-.31***
	Associate Professor	102	-.09
	Assistant Professor	157	-.05
	Instructor	27	-.05
Age	Under 30	61	-.05
	31-39 Years	133	-.28**
	40-49 Years	107	-.27**
	50-59 Years	95	-.04
	Over 60 Years	37	-.04
Sex	Male	356	-.21**
	Female	76	-.08
Salary Perception	Below Average	217	-.13
	Average	153	-.12
	Above Average	49	-.20
Tenure Status	Not Tenured	234	-.02
	Tenured	191	-.30***
Membership	AFT	32	+.05
	AAUP	135	-.14
	None	250	-.08

**Significant at the .01 level.

*** Significant at the .001 level.

correlation coefficients of each class together with a test of significance is presented in Table 2. The results (Table 2) indicate a significant correlation between shared authority and collective bargaining only for professors (r=-.31), age ranges 30-39 (r=-.28) and 40-49 (r=-.27), males (r=-.21) and tenured faculty (r=-.30). Correlations substantially below that for the entire sample (r=-.14) were noted for all ranks except professor, females (r=-.08), nontenured faculty (r=-.02), AFT members (+.05), and the non-membership class (r=-.08).

The comparison of correlation coefficients between classes within a subgroup indicated only two significant

Table 3

PEARSON PRODUCT-MOMENT COORELATION COEFFICIENTS AND COEFFICIENTS OF DETERMINANTS FOR FACULTY SCORES ON THE COLLECTIVE BARGAINING SCALE BY SUBGROUPS

Faculty Characteristic	Correlation Coefficient	Coefficient of Determination r^2
Rank	-.13**	.02
Age	.20**	.04
Sex	.14**	.02
Salary Perception	.17**	.03
Tenure Status	.16**	.02
Organization Membership	.35**	.12

N = 433

** Correlation coefficient significant at the .01 level.

differences (.05 level). The correlation between shared authority and collective bargaining was significantly higher for professors (r= -.31) than assistant professors (r= -.05). Similarly tenured faculty (r= -.30) had higher correlation coefficients than did nontenured faculty (r= -.02)

Faculty Characteristics

Pearson product-moment correlation coefficients were computed between the selected faculty characteristics — age, rank, sex, tenure status, salary perception, organizational membership — and collective bargaining attitudes. The results including the correlation coefficeint, coefficient of determination and test of significance are summarized in Table 3. Because directionality was not hypothesized, a two-tailed test of significance at the .05 level was selected.

Path Analysis

The results of this study, as have the previous studies, indicated a significant but weak linear relationship between demographic characteristics and collective bargaining attitudes. Therefore further analysis to examine the meaningfulness of these relationships was indicated.

First a hypothesized causal model was developed specifying the interrelationship between the independent variables — rank, age, sex, salary perception (SP), tenure status (TS), liberal-conservatism (LC), shared authority (SA), organizational membership (OM) — and collective bargaining attitudes. Second, the causal model was tested using the techniques of path analysis.

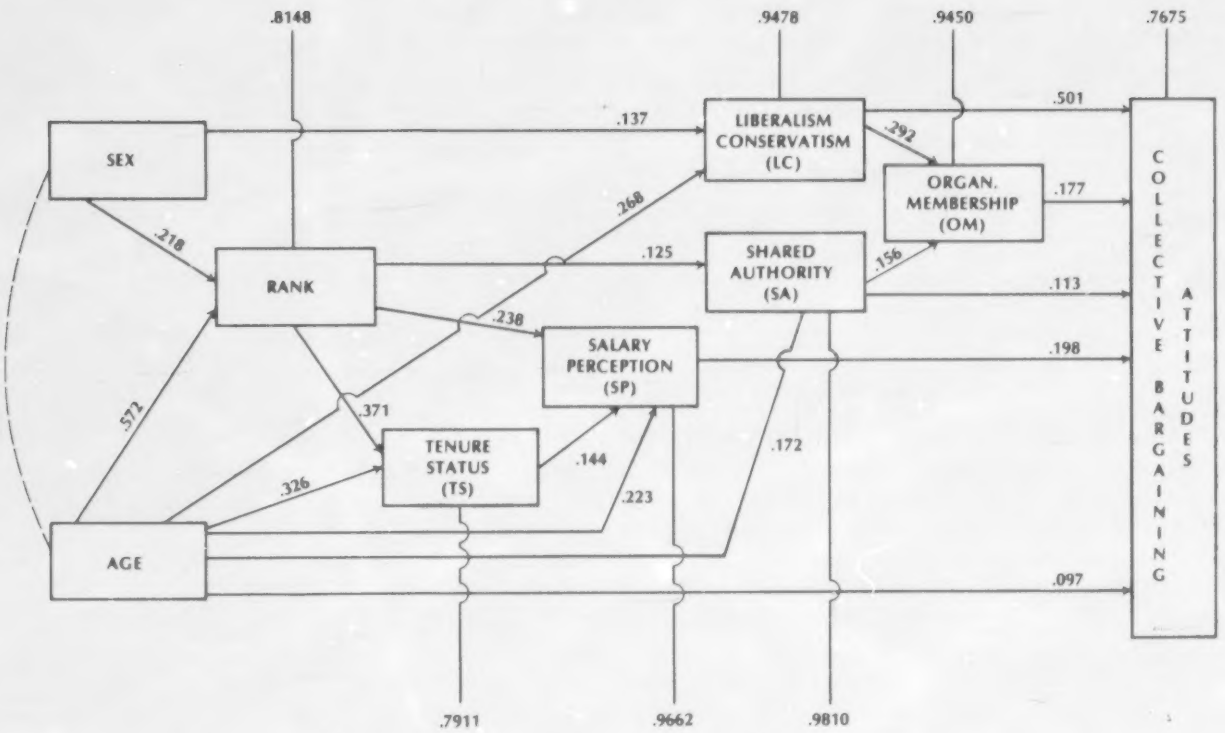
The results of that analysis according to the hypothesized causal ordering are summarized in Figure 1. The direct effects between determining and the dependent variables are shown by straigh line arrows. The value accompanying those arrows is the path coefficient (i.e., standardized regression coefficient). The curved arrow between age and sex indicates an unanalyzed correlation. The arrows coming from outer space denote the residual (i.e., the variance unexplained by the multiple regression equation).

According to the hypothesized causal model, certain relationships are assumed. First, sex and age influenced rank. Both variables were found to have significant path coefficients with age being the stronger of the two.

Second; rank, age, and sex influenced tenure status (TS). Only rank and age had significant path coefficients with (TS). Substantially, this finding says that sex does not have a direct bearing upon (TS) but does have an indirect effect through its influence on rank. With sex removed from the regression equation new path coefficients were computed indicating rank somewhat stronger than age.

Third; rank, age, sex and tenure status (TS) influence salary perception (SP) of these variables only sex

Figure 1
PATH ANALYSIS SUMMARY



was found to have an insignificant path coefficient. This means that sex does not have a direct effect on (SP) other than its transmitted through rank directly to (SP) or indirectly through (TS). The new path coefficients computed with sex deleted indicated that rank had a stronger influence than either age or (TS).

Fourth; age, rank, sex, tenure status (TS), and salary perception (SP) influence liberal-conservatism (LC). Only age and sex were found to have a significant path coefficient with (LC). This means that rank, (TS), and (SP) do not have a direct effect on (LC). The new path coefficients with rank, (TS), (SP) deleted indicated that age has a greater influence.

Fifth; rank, age, sex, tenure status (TS), and salary perception (SP) influenced shared authority (SA). The regression analysis indicated that age, rank, and (SP) directly influenced (SA). This means that the influence of sex is indirect and only to the extent it affects rank which affects (SP).

Sixth; rank, age, sex, tenure status (TS), salary perception (SP), liberal-conservatism (LC), and shared authority (SA) influenced organizational membership. The regression analysis showed that of these variables only (LC) and (SA) were directly related. The remaining variables had indirect effects through these two variables. The various paths were discussed under the section dealing with (LC) and (SA) as dependent variables.

Lastly, all of the independent variables, rank, age, sex, tenure status (TS), salary perception (SP), liberal-conservatism (LC), shared authority (SA), and organizational membership (OM) influenced collective bargaining attitudes. The regression analysis showed that age, (LC), (SA), (SP), and (OM), had significant path coefficients with collective bargaining. This means that sex, rank and (TS) influence collective bargaining attitudes only to the extent of their indirect influence on (LC), (SA), and (OM). When the path coefficients were recomputed with rank, sex and (TS) deleted, the significant variables, in order of the strength of their effects were (LC), (SP), (OM), (SA) and age.

The results of path analysis indicated that sex, rank, and tenure status do not have a direct effect on collective bargaining attitudes. According to path theorem, if a truly

nonsignificant path is deleted, the recalculated correlation will equal the original zero-order correlation. To test the deleted paths, rank, sex, and tenure status, the correlation coefficients for the entire matrix were recalculated. Table 4 presents the correlation matrix with the original coefficient on top and the recalculated coefficients on the bottom. Acceptable differences (less than .05) between the original and recalculated correlation coefficients were indicated for sex, rank, and tenure status. A comparison of the difference between original and recalculated correlation coefficients for the entire matrix suggests a reasonably close fit for the hypothesized model.

Summary

Analysis of the liberal-conservatism scale revealed a significant positive correlation between faculty liberalism and favorable collective bargaining attitudes. The strength of this correlation was weakest for faculty who were over 60 years of age, tenured, of the rank of professor, or a member of AFT or AAUP. When correlations were compared between groups, significant differences were noted for the following groups: professors-instructors, professors-assistant professors, tenured-not tenured, AAUP-none, and AFT-none.

The analysis concerning the shared authority scale revealed a significant correlation between a low perception of department autonomy and favorable collective bargaining attitudes. The strength of this correlation was increased for faculty who were a full professor, male, or tenured. When correlations were compared between groups, a significant difference was noted between professor-assistant professor and tenured-non tenured groups.

The results of the path analysis indicated that sex, rank, and tenure status do not have a significant direct effect on collective bargaining attitudes. The effect of age on collective barganing attitudes was found to be primarily indirect, although a small direct effect was noted.

Conclusion

The findings suggest that factors contributing to faculty attitudes toward collective bargaining may be more complex than has been generally acknowledged. The reliance upon basic faculty demographic characteristics may be limited to describing the proponents of collective

TABLE 4

CORRELATION MATRIX INDEPENDENT VARIABLES WITH COLLECTIVE BARGAINING FOR ORIGINAL ZERO ORDER CORRELATION COEFFICIENTS (UPPER PART) AND RECALCULATED CORRELATION COEFFICIENTS (LOWER PART)

Independent Variables	Sex	Age	Rank	Tenure	Salary	Shared Authority	Liberal Conservatism	Organizational Membership	Collective Bargaining Attit.
Sex		.1542	.1293	.0529	-.1468	.0443	-.1779	.0803	.1409
Age	.1542		-.5384	.5257	-.1701	.1212	-.2887	.0090	.1952
Rank	.1299	-.5384		-.5464	-.0397	.0358	.1290	.0255	-.1288
Tenure	.0023	.5255	-.5464		-.1311	.0414	-.2134	.0405	.1577
Salary	-.0736*	-.2040	.0364	.1341		-.1291	.0711	.0688	.1728
Shared Authority	.0496	.1210	.0284	.0347	-.1291		-.0286	-.1473	-.1391
Liberal Conservatism	-.1778	-.2886	.1264	-.1479*	.0556			-.2874	-.5629
Organizational Membership	.0442	.0653*	.0432	.0357	.0039*	-.1641	-.2963		.3525
Collective Bargaining Attitudes	.1029	.2053	-.0829	.1728	.1708	-.1677	-.5661	.3453	

*** Difference between original zero order correlation and recalculated correlation greater than .05.**

bargaining rather than explaining their preference. Age, sex, rank, and tenure status appear to affect collective bargaining attitudes primarily in an indirect way and thus have limited use as predictors.

The findings concerning the liberal-conservatism scale suggest that faculty attitudes toward collective bargaining are broadly based and generally similar to an individual's view of government and society. Refined analysis of this variable suggests that specific situational variables tend to override this general relationship.

The relative weakness of the relationship of the shared authority scale to collective bargaining attitudes suggests that emphasis on this determinant may be misplaced. It should be noted, however, that this variable is related to departmental autonomy. The findings suggest that the strength of this relationship may be depressed because of differences of individual autonomy within departments.

The results concerning salary perception generally support the emphasis of collective bargaining on economic issues. However, the weakness of this relationship suggests that reliance on this determinant as being primary may not be justified.

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AN ANALYSIS OF THE EFFECTS OF TUITION AND FINANCIAL AID POLICIES

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This paper describes an analysis of the effect(s) and feasibility of changes of tuition and financial aid policies which may be implemented to guarantee opportunity for a college education to all qualified college-age youth. The effect(s) of such policy changes are described in terms of expected changes in college enrollments, classified by income distributions of college enrollments, which result from changes in the "unmet costs" borne by students from different family income groups. Such "unmet costs" are defined as the sum of the expected parental and student contributions towards college expenses and financial aids (excluding loans and employment).

Introduction

In its regular meeting of December 1970, the State of Illinois Board of Higher Education approved an increase of tuition charges for *public* senior institutions. This increase was the first of a series of significant tuition increases to be experienced in the early seventies.

These drastic increases in tuitions have generated numerous discussions on the role of public education and the effect of high costs on the ability of all qualified youth to obtain a college education. "Equal opportunity" has become the central issue in all discussions of tuition levels and financial aid programs. The concept of "equal opportunity" has been described by Hansen and Weisbrod in the following manner:

> First and foremost, one of society's major goals is that of promoting greater equality of opportunity, a goal that can be achieved by making post-secondary education and training more generally available. This means that all students wishing to should be able to attend a post-secondary school for which they are qualified, and to do so without undue financial concern.[1]

"Equal opportunity" has been an integral part of American democracy, which has led to the large growth of publicly-supported institutions of higher education in the United States, especially since 1945. It is this concept which has resulted in low tuition levels, although evidence does not shown that "equal opportunity" has been achieved.

The Tuition Controversy

The trend towards higher tuition levels at public institutions has renewed the debate as to whether low tuition levels should be maintained or whether, in fact, higher tuition levels may facilitate the achievement of "equal opportunity" by allocating a part of the additional income to financial aid programs which would remove financial barriers from college education.

Three significant lines of thought have been developed to support high tuition levels:

A. The subsidy argument — Proponents of higher tuition levels are well represented by the following statement made by Bolton:

> Some argue strongly that the present system excessively subsidizes higher income families, because the low tuition in public institutions is available to students without consideration of whether they could pay their own way.[2]

It follows then, that by increasing tuition, funds would be made available to allocate to financial aid programs which would make "equal opportunity" objectives possible. The net effect would be that of shifting costs to higher and higher-middle class families while lowering the costs of a college education to low and lower-middle class families.

B. The viability of private education argument — Low tuitions have created a concern over their effects on the viability of private institutions. This concern was expressed in the "Higher Education in the United States: The Economic Problem" Seminar held in 1958:

> The private colleges fear that tax-supported, low tuition state universities may eventually run them into bankruptcy.[3]

Higher tuitions at public institutions would insure the viability of private institutions since the later would become price-competitive.

C. The benefits argument — Another view in the tuition debate has been presented by those who have discussed college education in terms of societal and personal beneifts. Owen exemplifies this argument in the following statement:

> Many economists, and others, believe that the subsidy of college students is justified on the grounds that, without subsidy, the private value of a youth's college would typically be less than its social value — thus leading to a

> less than socially optimal level of expenditures on college education.[4]

Owen also asserts that both private and social benefits and costs will be different for different groups; for example, for non-whites the private value may be lower and the social benefit may be higher. This argument supports policies which increase subsidies to low and lower-middle class youth.

Proponents of low tuition levels argue that high tuition levels would destroy the illusion that education can be had cheaply, therefore, discouraging low and lower-middle class youth from obtaining a college education.

In the final analysis, a decision of low versus high tuition is based on the political factors affecting the state and, more importantly, the resources available to the state. The most important factor will be the willingness of society to support programs which will assume the achievement of "equal opportunity" objectives.

Analysis of Tuition — Financial Aid Models

The issues discussed in the previous section raise several concerns as to the mechanics required to achieve "equal opportunity." Whether tuitions should remain low or should be increased, or whether societal and personal benefits should be accounted for by the pricing structure of college institutions are not treated here as the principal issues. The achievement of "equal opportunity" is treated as an economic issue, with attention to: plans that recognize limited public resources, the likelihood that tuition levels will be increased and larger subsidies may be given to students from low and lower middle income families, and that these steps will be taken not on the basis of the social criterion of *who deserves* assistance, but by the economic criterion of *who needs* it most.

The effect of tuition and financial aid policies is evaluated in terms of the impact of college-age youth and their families. The decision to attend college may be affected by the following factors, as described by Hansen and Weisbrod:

> The cost of a college education to a student and his family — apart from the income foregone — can be analyzed in two parts. One can be termed the "price" of education — the tuition charge, the books and supplies, and so forth. The second is the "ease of financing" that price — that is, the availability and terms of loan funds and scholarships.[5]

The financial aid available to needy students may be of three forms: gift aid, part-time employment, and loans. Gift aid may be defined as a non-repayable subsidy awarded directly to the student, while a loan will require repayment of the original amount plus added interest. The analysis presented in this paper assumes that only gift aid will be considered as an effective tool to help achieve "equal opportunity," while loans may be used by students and/or parents to finance the expected contributions to the cost of education and the unmet cost — the portion of college costs not covered by gift aid.

During 1964, the Illinois Board of Higher Education conducted a study to analyze the composition of the student body in institutions of higher education in the State of Illinois. This study concluded that:

> Based on high school rank in graduating classes, 25% of those students in the upper quarter and 44% of those in the second quarter do not go on to college.[6]

The results of this study gave impetus to the rapid growth of the Illinois State Scholarship Commission (ISSC). This growth is consistent with the direction recommended by the Board of Higher Education in its attempt to achieve "equal opportunity" in the State of Illinois. The objectives of the Illinois State Scholarship Commission are expressed in its 1970 Annual Report:

> . . . to remove financial barriers to college attendance; to expand college choice; and to permit thousands of students to attend non-public colleges who would have otherwise attended public colleges and added to the state subsidy of operating and capital expenditures.[7]

The Illinois State Scholarship Commission (ISSC) offers two major financial aid programs:

1. Non-repayable grants awarded to "needy" undergraduate students, and
2. Guaranteed loans granted to students through commercial lenders.

The scholarship and grant programs are limited to full-time undergraduate students who are residents of the State of Illinois and are enrolled in-state in an institution of higher education. The Higher Education Student Assistance Law permits the ISSC to grant awards up to either $1,200 per year or tuition and fees, whichever is less.

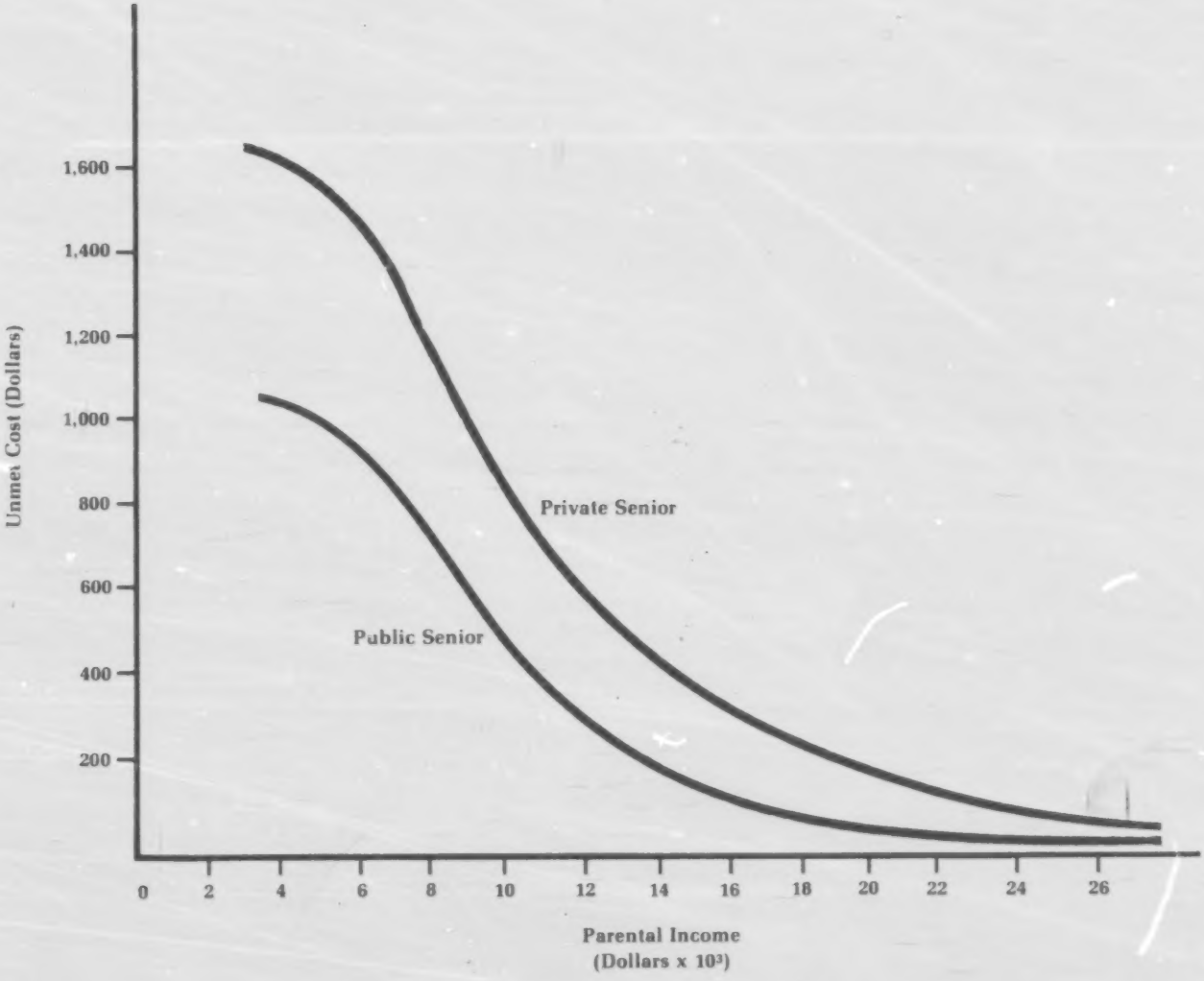
An analysis of the distribution of ISSC awards raises questions over the limitations of the Higher Education Student Assistance Law. Figure 1 shows the 1972-73 distribution of unmet costs for ISSC recipients attending public and private senior institutions. This distribution brings to question whether the ISSC objectives, stated previously, have been achieved.

In order to analyze the effect of improvements of the ISSC programs, a computer simulation program was developed to evaluate changes in the following policies:

1. The tuition level for the public senior institution was increased up to three times the 1970-71 levels.
2. The extent of coverage of ISSC awards was varied between the current tuition and fees limitations up to a coverage of 100% need beyond tuition and fees, and
3. The maximum size of ISSC awards was varied between the current $1,200 and $3,000.

The computer simulation program subdivides the

Figure 1
UNMET COST DISTRIBUTION



college population into twelve parental income categories, and estimates for each category the amounts of financial aid and unmet cost for a given set of tuition and financial aid policies. An "equity index" was also calculated and was defined as the standard deviation of unmet costs. This index provides a measure of the achievement of "equal opportunity."

The development of the model was divided into three parts:

A. *Description of the College Population of the State of Illinois*

The college population was described in terms of income distribution, choice of institution, and expected parental contributions toward college expenses. This information was not available at the time, resulting in the following approaches:

1. *Income distribution* — The most reliable information was found from the freshmen surveys performed by the American Council of Education (ACE).
2. *Expected parental contribution* — the expected parental contribution towards college expenses

was based on the College Scholarship Service 1971 estimates. The following assumptions were made relative to the number of dependents by family income:

a. Families whose incomes are less than $10,000 average three dependents, and
b. Families with incomes above $10,000 average two dependents.

B. *Writing of the Computer Simulation Program*

The program used as inputs data which described: public senior, public junior, private senior, and private junior institutions (i.e., tuitions, college budgets, and full-time enrollments) and the college population at each type of institution (i.e., the information provided by ACE and average gift aid other than ISSC). The outputs of the computer simulation program are summarized in Table 1.

C. *Incorporation of Price Elasticities of the Demand for Higher Education*

Price elasticities of the demand for higher education have been estimated in works by Miller,[8] Campbell and Siegel,[9] Feldman and Hoenack,[10] Hopkins,[11] Hoenack,[12] and Zorazzini.[13] Miller, for example, arrived at the conclusion that low income groups had a relatively elastic demand for higher education with respect to price, while high income groups had an inelastic higher education demand with respect to price. Although not necessarily representative of the behavior of college youth and their families in the State of Illinois, the results obtained by Corazzini, *et al*, were utilized in this analysis.

Corazzini, *et al*, estimated price elasticities by runing separate regressions on samples stratified by the Project TALENT by SES variable. They arrived at the following estimates:

a. $E_p = -.32$ for the low SES and
b. $E_p = -.18$ for the high SES.

The incorporation of price elasticities of demand for higher education into the models previously described in this paper permits the evaluation of the effect of changes of tuition and financial aid policies on the total enrollment of the state and on the enrollments by institution type. Changes in enrollments by income group and by institution type will be based on changes of the "price" of education.

The "price" of education for an individual was defined as the sum of the expected parental and student contributions towards college expenses, and the unmet cost. Since, as was shown previously, unmet costs will vary for different income groups as tuitions for public senior institutions and financial aid policies are varied, two effects on enrollment can be expected:

1. *An increase in the price of education* — This increase will result from an increase in tuition which must be absorbed by the student and his family. This condition may be more typical for upper middle and high income families. The expected effects on enrollment are explained by Hopkins' definitions:

   a. "*Substitution*" *effect* — Some students (69% of attrition), from public senior institutions could shift to private institutions, and
   b. "*Net discouragement*" *effect* — Some students (31% of attrition), from public senior institutions would drop out of college altogether.

2. *A decrease in the price of education* — An increase of financial aid, in the form of monetary grants and tuition and fee waivers, to low and middle income college youth will decrease their price of education. This will result in an increase in their enrollments in institutions of higher education.

Table 2 describes the effect on students attending public senior institutions in the State of Illinois of increases in tuition levels coupled with improvements in financial aid programs offered by the ISSC. The following set of policies is investigated:

1. Tuition level at public senior institutions: two and half times 1970-71 levels.
2. Maximum award — $3,000.
3. Percent coverage beyond tuition and fees — 100%.

Two distinct effects can be identified:

1. Unmet costs are decreased fow low and middle income families. The new map of unmet costs results from a significant improvement of the Illinois State Scholarship Commission financial aid policies.
2. The expected income distribution of enrollments in public senior institutions changes in two significant ways:

   a. Enrollment of youth from low and middle income families increases (4,554 new students from families earning below $10,000), as a result of improved financial aid policies which lower the price of education. The percentage of enrollments from families earning below $6,000 increases from the current 7.2% to 8.6% of the total enrollment in public senior institutions.
   b. Enrollment of youth from upper middle and upper income families decreases (3,316 students from families earning above $10,000), as a result of increases in tuitions which raise the price of education. The percentage of enrollments from families earning above $25,000 decreases from the current 9.0% to 8.6% of the total enrollment in public senior institutions.

Table 1

SUMMARY OF OUTPUTS OF THE COMPUTER SIMULATION PROGRAM

E	TUITION = T_o (1970-71)				TUITION = 2.0 T_o				TUITION = 2.5 T_o				TUITION = 3.0 T_o			
	M	C	TR	N	M	C	TR	N	M	C	TR	N	M	C	TR	N
$ 40	$2700	100%	$40.0	$-71.7	$2700	100%	$80.0	$-44.7	$2700	100%	$100.0	$-34.4	$2700	100%	$120.0	$-22.5
$100	$1800	100%	$40.0	$ 65.6	$1800	100%	$80.0	$ 38.6	$2400	80%	$100.0	$ 27.2	$2400	80%	$120.0	$ 16.1
$150	$1800	80%	$40.0	$ 59.1	$1800	80%	$80.0	$ 33.1	$1800	80%	$100.0	$ 22.2	$1800	100%	$120.0	$ 13.6
$200	$2100	60%	$40.0	$ 51.2	$2100	60%	$80.0	$ 25.6	$2100	60%	$100.0	$ 14.7	$2100	60%	$120.0	$ 3.8
$250	$1500	60%	$40.0	$ 43.4	$1500	60%	$80.0	$ 17.8	$1500	60%	$100.0	$ 6.9	$1500	80%	$120.0	$ .8
$300	$1800	40%	$40.0	$ 36.9	$1800	40%	$80.0	$ 11.8	$1800	40%	$100.0	$ 1.1	$1800	40%	$120.0	$+9.6
$360	$1200	40%	$40.0	$ 27.5	$1200	40%	$80.0	$ 2.4	$2100	20%	$100.0	$+8.0	$2100	20%	$120.0	$ 18.5
$410	$1500	20%	$40.0	$ 21.3	$1500	20%	$80.0	$+3.5	$1500	20%	$100.0	$ 13.9	$1200	40%	$120.0	$ 23.0
$470	$1800	0%	$40.0	$ 14.5	$1800	0%	$80.0	$ 9.9	$1800	0%	$100.0	$ 20.1	$1800	0%	$120.0	$ 30.4
$520	$1200	0%	$40.0	$ 5.6	$1200	0%	$80.0	$ 18.8	$1200	0%	$100.0	$ 29.0	$1200	0%	$120.0	$ 39.3

E - Equity index; the standard deviation of unmet costs.

M - Maximum award value.

C - Extent of coverage - the percentage of financial need minus tuition and fees by which awards may exceed tuition and fees.

TR - Tuition revenues from public senior institutions.

N - Net profit or loss to the State; the difference between tuition revenues from public senior institutions and ISSC expenditures.

Table 2

Combined Effects of Tuition and Financial Aid Policies
on Total Price and Enrollments
Type of Institution: Public Senior

FAMILY INCOME	UNMET COST		TOTAL PRICE[1]		% CHANGE IN PRICE	FALL 1970 ENROLLMENTS	CHANGE IN ENROLLMENTS	NEW ENROLLMENTS	PRICE ELASTICITY
	PLAN A	PLAN B	PLAN A	PLAN B					
0000-3999	$1108	$ 42	$1608	$ 542	-.66	3,388	+ 715	4,103	-.32
4000-5999	1118	52	1618	552	-.66	5,995	+ 1,187	7,182	-.30
6000-7999	883	117	1638	872	-.47	10,425	+ 1,371	11,796	-.28
8000-9999	520	54	1650	1184	-.28	17,593	+ 1,281	18,874	-.26
10000-12499	44	44	1939	2092	+.08	25,021	- 480	24,541	-.24
12500-14999	0	0	2100	2550	+.21	22,284	- 1,030	21,254	-.22
15000-19999	0	0	2100	2550	+.21	21,893	- 920	20,973	-.20
20000-24999	0	0	2100	2550	+.21	11,729	- 443	11,286	-.18
25000-29999	0	0	2100	2550	+.21	4,561	- 72	4,389	-.18
30000-34999	0	0	2100	2550	+.21	2,997	- 113	2,884	-.18
35000-39999	0	0	2100	2550	+.21	1,443	- 55	1,388	-.18
over 40,000	0	0	2100	2550	+.21	2,737	- 103	2,634	-.18
						130,066	+ 1,238	131,304	

[1] Total Price = Unmet Cost + Expected Parental and Student Contributions

PLAN A (current)	PLAN B
Tuition Level: T_o (1970)	2.5 T_o
Max $1200	3000
Financial Aid Beyond Tuition and Fees 0%	100%

The results of this analysis point towards financial aid programs aimed at achieving two essential objectives:

1. Equalizing the burden for students currently attending institutions of higher education, and
2. Reducing or eliminating financial barriers to academically able college-age youth, who, otherwise, would not consider enrolling in college.

However, these results neither support nor reject low or high levels of tuition. The objectives stated above could be achieved just as well by maintaining low tuition levels and increasing the state investment in the programs of the ISSC.

A Challenge to Current Policy Trends

In the past few years, large impetus has been given to those attempting to resolve the financial problems faced by institutions of higher education and college-age youth, to implement policies which combine increase of tuition levels and the expansion of financial programs. Certainly, such policies appear to be feasible, as is shown in the previous section, but, in the opinion of the author, they are subject to challenge.

Tuitions at public institutions have been treated erroneously as the *price* to purchase an education, although tuitions have been related to the cost of education on an arbitrary basis only. Tuitions at public institutions are, in fact, a form of *user taxes* and public institutions of higher education act as agents for the state as *tax collectors*. If tuitions are treated as taxes, then it follows that their levels should not be established on an arbitrary or philosophical basis, but should be tied to the state's tax structure which relates financial requirements to the commitments or needs of public service.

In the same vein, financial aid programs must be treated as a service provided by the state. The decisions on the level of support of this service should be based on political interest groups. All play a role in making decisions about the shape and position of unmet-cost maps. The flow of funds, such as tuitions or user taxes, from students through public institutions of the state government, the support to institutions of higher education from the state to the institutions and indirectly to students, and the support of financial aid programs from the state through an appropriate agency to students is described in Figure 2.

The proposed definition of tuition as taxes reduces the value of the *subsidy* and the *viability of private education* arguments since the state government has the option to legislate the level of subsidy given to each citizen for each type of public service. The level of support to financial aid programs may be determined by using the *benefits* argument, or the basic premise that all qualified citizens are entitled to a college education with the absence of financial barriers. This approach would allow the achievement of "equal opportunity" objectives independent of tuition policies.

Conclusion

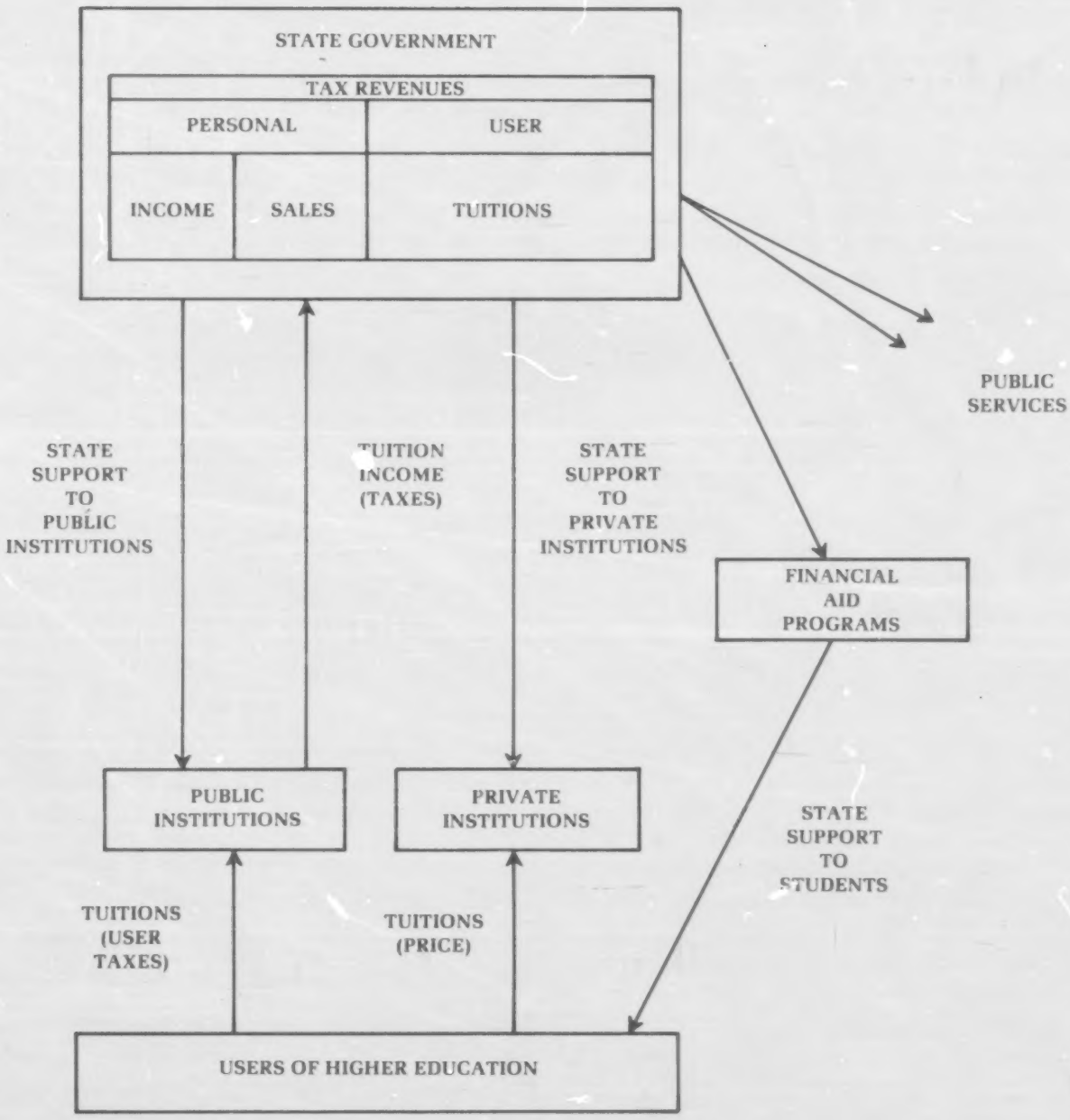
During the last few years, rising costs of education and limited government resources have resulted in pressures to increase tuitions at public insitutions. Impetus to increase tuitions at public institutions has come from those who believe that low tuitions are not sufficient to insure an "equal opportunity" to obtain a college education; two problems are identified:

1. Students from high and higher-middle class families receive a large subsidy which they do not need, and
2. Private institutions risk financial bankruptcy since they are unable to compete on a tuition basis.

Proponents of higher tuitions recommend that increases in tuitions should be coupled with increases in financial aid programs. The expected result would be to generate additional funds for the operation of institutions of higher education and funds required to obtain "equal opportunity" objectives through expended financial aid programs.

Although these proposals are feasible from an implementation view, they are not realistic from an economic and political view. Policies on tuition levels and financial aid programs should be *independent* of each other and should *not be combined*.

Figure 2
FLOW OF TUITION INCOME AND FUNDS TO SUPPORT FINANCIAL AID PROGRAMS



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[3]Seminar "Higher Education in the United States: The Economic Problem," *Review of Economics and Statistics* (August 1960), 42, No. 3, p. 37.

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[5]Hansen, Lee and Weisbrod, Burton, A., "The Search for Equity in Provision and Finance of Higher Education," in *The Economics and Financing of Higher Education in the United States*, Washington, D.C., 1969, p. 109.

[6]*A Master Plan for Higher Education*, The Illinois Board of Higher Education, July 1964, p. 22.

[7]*Report*, Illinois State Scholarship Commission, May 1970, p. 1.

[8]Miller, Leonard S., *Demand for Higher Education in the United States*, State University of New York at Stony Brook, New York, 1971.

[9]Campbell, Robert and Siegel, B.N., "Demand of Higher Education in the United States," *American Economic Review* (June 1967), Vol. 57, pp. 482-489.

[10]Feldman, Paul and Hoenack, Stephen A., "Private Demand for Higher Education in the United States," in *The Economics and Financing of Higher Education in the United States*, Washington, D.C., U.S. Government Printing Office, 1969, p. 375-398.

[11]Hopkins, Thomas D., *The Provision of Higher Education: A Market Interpretation*, Yale University, New Haven, Connecticut, 1971.

[12]Hoenack, Stephen A., *Private Demand for Higher Education in California*, Office of Analytical Studies, University of California, 1967.

[13]Corazzini, Arthur, Dryan, Dennis J., and Grabowski, Henry, "Determinants and Distributional Aspects of Enrollment in U.S. Higher Education," *Journal of Human Resources* (Winter 1972), Vol. 7, No. 1, pp. 39-50.

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THE EDUCATIONAL ATTITUDES AND ORIENTATIONS OF UNDERGRADUATES: A NEW MEANS OF ASSESSMENT

Barry R. Morstain, University of Delaware

The research reported in this paper is focused on the attitudes and orientation which students have toward various philosophies, purposes, and processes of a college education. Even to casual observers of the higher education scene, it is well known that our colleges and universities enroll individuals with tremendously different backgrounds, interests, and abilities. As Cross (1971) indicates, institutions are faced with an increasingly heterogeneous student population. What are the interests and learning orientations of our students? What are their attitudes about the curricular-instructional policies which affect them? What kind of educational processes do they desire? Moreover, what relationship exists between students' educational attitudes and their patterns of growth in both the cognitive and non-cognitive domains? These have been and will continue to be major questions at institutions of higher learning, although to date little effort has been focused on these particular areas of inquiry.

This is not to say that little has been done in the area of research on college students. To the contrary, Feldman and Newcomb (1969) have reviewed and compiled a massive number of research studies which have been undertaken over the last four decades. Mechanisms to exist for determining general characteristics and attitudes of students — the American Council on Education's Survey of Entering Freshmen and the College Student Questionnaire (Peterson, 1965) are prime examples. Research on student perceptions of the college environment performed by Pace (1963) and Stern (1963), personality characteristic studies (Heist and Yonge, 1968), student "satisfaction" studies by Pervin (1967), Betz, *et. al.* (1971) are valuable in their own right. However, these types of research studies do not necessarily involve consideration of the implications of curricular-instructional situations since for the most part, the research inventories employed do not deal directly with students' attitudes regarding educational processes and policies.

Thus, the first task in this project was one of devising an instrument appropriate for our purposes, namely, providing a way to assess students' attitudes regarding their preferred modes of learning, their views on student-faculty roles in educational decision-making, and so on. After extensive pre-testing of items and factor analyses (principal components), these efforts culminated in the development of the *Student Orientations Survey* (Gray and Morstain, 1970) and this inventory was used in this inter-institutional research study. There are ten scales in the Student Orientation Survey (SOS) with each scale consisting of eight items. Each item has four Likert-type response categories, ranging from "not at all like my attitude" to "closely reflects my attitude."

Before presenting some attitudinal profiles of students in different institutions and/or different degree programs, it would be helpful to give a brief overview and description of the SOS scales.[1] The SOS assesses five major dimensions or areas of student orientations to college, and, as noted below, each dimension is comprised of two corresponding scales. The dimensions and scales are as follows:

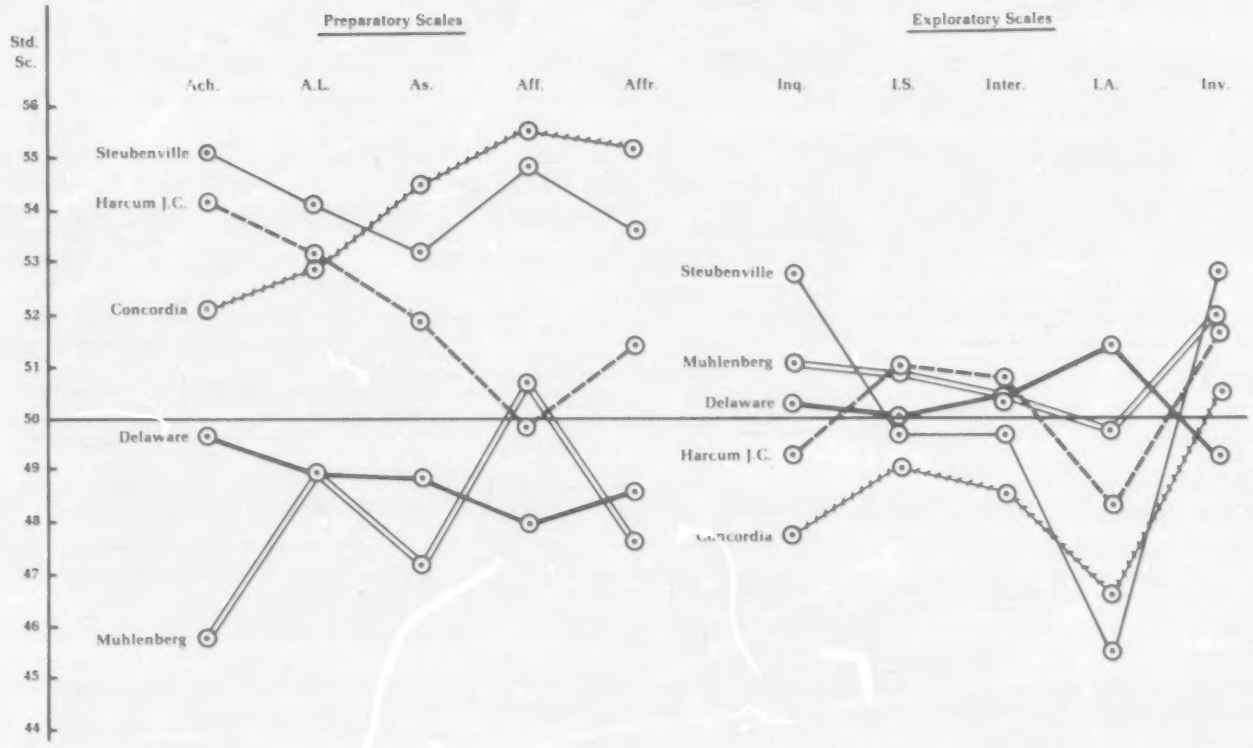
Table I

STUDENT ORIENTATIONS TO COLLEGE

"Preparatory" Orientations (5 Scales)	DIMENSIONS (Areas of Orientation)	"Exploratory" Orientations (5 Scales)
Achievement	1. PURPOSE	Inquiry
Assignment Learning	2. PROCESS	Independent Study
Assessment	3. POWER	Interaction
Affiliation	4. PEERS	Informal Assoc.
Affirmation	5. PUBLIC POSITION	Involvement

Given the pattern of scale intercorrelations, one set in five scales clustered together in what has been interpreted as a general "Preparatory" orientation to college, and another set of five scales were related to a general "Exploratory" orientation to college. That is, it appears that while college is most highly valued by some for its *preparatory* function — in terms of acquiring useful knowledge, skills, vocations, and social roles — it is valued most highly by others for its *exploratory* possibilities — i.e., for the opportunities it affords for exploring one's interests, ideas, and personal identity. These general orientations become more apparent when one examines the content and

Figure 1
SOS PROFILES FOR FIVE INSTITUTIONS



description of the ten scales. The five scales which deal with the "Preparatory" orientation are:

Achievement (ach.)
This scale measures the degree to which a student is oriented toward (1) the achievement of *a priori* goals (usually some career in particular or success in general), (2) the acquisition of specific skills or credentials, (3) the satisfaction of receiving external rewards. The student who identifies with the contents of these items has a practical, goal-oriented outlook and tends to gauge various aspects of the college experience in terms of their future usefulness.

Assignment Learning (A.L.)
The student who agrees with a high proportion of the items on this scale reports that he learns best by meeting specific, clear-cut, formal requirements. His mode of learning is linear, i.e., he likes to master specified blocks or units of knowledge sequentially.

Assessment (As.)
An evaluation by those in authority seems to be quite important to the student who scores high on this scale. Grades and examinations are valued by this student because they provide not only some measure of his abilities but some incentive for using those abilities.

Affiliation (Affl.)
The student who prefers the manner of relating to peers expressed in items on this scale enjoys belonging to organized extracurricular groups. He appears to value the assurance of friendships such affiliation provides. Furthermore, he stresses the importance of maintaining strong institutional loyalty and support.

Affirmation (Affr.)
The student who agrees with items on this scale appears to affirm the values of a peaceful and orderly society. He tends to support public officials in their commitment to solve civic problems and feels "the majority can be counted on to make the right decisions." He would probably counsel care and caution in the area of social change.

The five 8-item scales which deal with the Exploratory Orientation are:

Inquiry (Inq.)
"Learning is its own reward"—in essence, this is the expressed motivation of the student who responds positively to most of the items on this scale. He concurs with statements which stress the value of insight, the perception of relationships, and knowing

how to learn. He expresses curiosity about many things and appears to enjoy the satisfaction of inquiry whether or not it brings with it any other reward.

Independent Study (I.S.)

The items on this scale help to identify the student who works best on his own. He prefers informal, unstructured courses in which he can set his own goals and standards and pursue his own interests. He appears to place a high value on freedom and independence.

Interaction (Inter.)

An egalitarian attitude toward faculty members characterizes the student with a high score on this scale. The individual sees students as fully competent to share educational decision-making with faculty. In this connection he expresses the belief that students should participate with faculty in planning courses and academic programs.

Informal Association (I.A.)

Spontaneity marks the pattern of peer-relationships expressed by the student who responds favorably to this cluster of items. He expresses little need for affiliation with organized groups or for participation in formal, well-planned events. His association with fellow-students also tends to be unstructured.

Involvement (Inv.)

A strong interest in social and political affairs characterizes the student who has a high score on this scale. He sees students as having a rightful place in dealing with the public problems of our time. Further, he expresses a concern for the welfare of others and states his readiness to take a stand on public issues.

Results

Over the course of this pilot study, undergraduates at eight colleges and universities were administered the *Student Orientations Survey* (total N=4279)[2]. At this point in the research project, the goal was to determine the degree to which the SOS could differentiate between students in various institutional settings and/or curricular programs. In this regard, SOS profiles for students in five different institutions are presented in standard score form in Figure 1.

For these institutions, the SOS means on the Preparatory scales show somewhat more variability than do the mean scores on the Exploratory scales. Students at Steubenville College (N=149), Harcum Junior College (N=92), and Concordia College (N=718), all private institutions, tend to have higher mean scores on the Preparatory scales of the SOS than do students at Muhlenberg College (N=425) and the University of Delaware (N=2446). With one exception (Muhlenberg's score on Affiliation), these latter two institutions have scores on all Preparatory scales below the five-institution mean.

For the Exploratory scales, there is somewhat less variability in mean scores on the Independent Study, Interaction, and Involvement scales.[3] Across the five institutions, however, there is more noticeable variation in mean scores on the Inquiry and Informal Association scales.

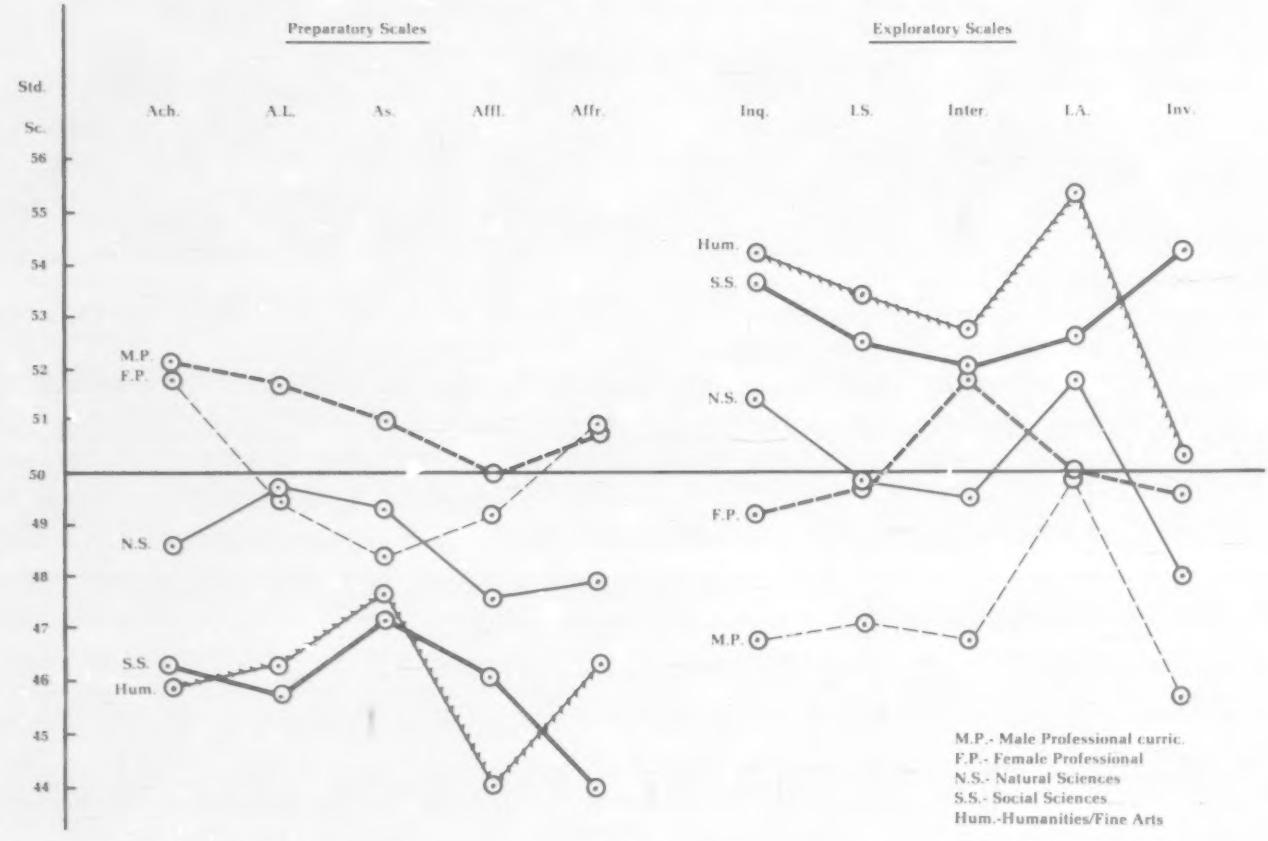
It was also hypothesized that the SOS profiles for students in different curricular areas would show as much if not more variability than inter-institutional comparisons. As there were fairly large Ns in five distinguishable curricula at the University of Delaware, a curricular program analysis was performed with data from the institution. SOS profiles for students majoring in the following areas are presented in Figure 2: social sciences (N=433), natural sciences (N=317), humanities and fine arts (N=317), predominantly male professional curricula — Engineering, Agriculture, Business (N=628), and predominantly female professional curricula — Nursing, Home Economics, and Education (N=723).

Students in the social sciences and humanities had relatively lower mean scores on all Preparatory scales than students in the other three curricular areas. The profile for students in the natural sciences was slightly below the normative mean score of 50 on these scales, and was midway between the profiles for students in male professional curricula and those students majoring in social sciences and humanities.

Overall, there was more curriculum group variation in mean scores on the Exploratory scales as compared to the interinstitutional profiles previously presented. Humanities and social science majors expressed relatively more interest in having a participatory role with faculty in educational decision-making (Interaction), had more desire in developing "learning contracts" and other independent study or off-campus experiences (Indep. Study), and tended to view learning as its own reward, whether or not this learning had a practical or vocational pay-off (Inquiry). Humanities majors also had the highest mean score on the Informal Association scale (a desire for unstructured, spontaneous peer-relationships) while social science majors, as might be expected, had the highest mean score in the Involvement scale (interest in socio-political issues). On the other hand, students in the male professional curricula had the lowest mean scores of all five Exploratory scales.[4]

In a related domain, previous research on students who "self-select" themselves into experimental programs had indicated that these students' general characteristics and personality orientations are substantially different from those of their peers in the regular curriculum (Heist and Bilousky, 1971; Suzcek and Alfert, 1970). It was hypothesized that differences in educational attitudes and orientations would also be evident for students in these two settings. SOS profiles for freshmen in traditional liberal arts curricula and freshmen who voluntarily participated in experimental programs at both the University of Hawaii

Figure 2
SOS PROFILES FOR STUDENTS IN DIFFERENT CURRICULA (UNIVERSITY OF DELAWARE)



and St. Olaf's College are presented in Figure 3.

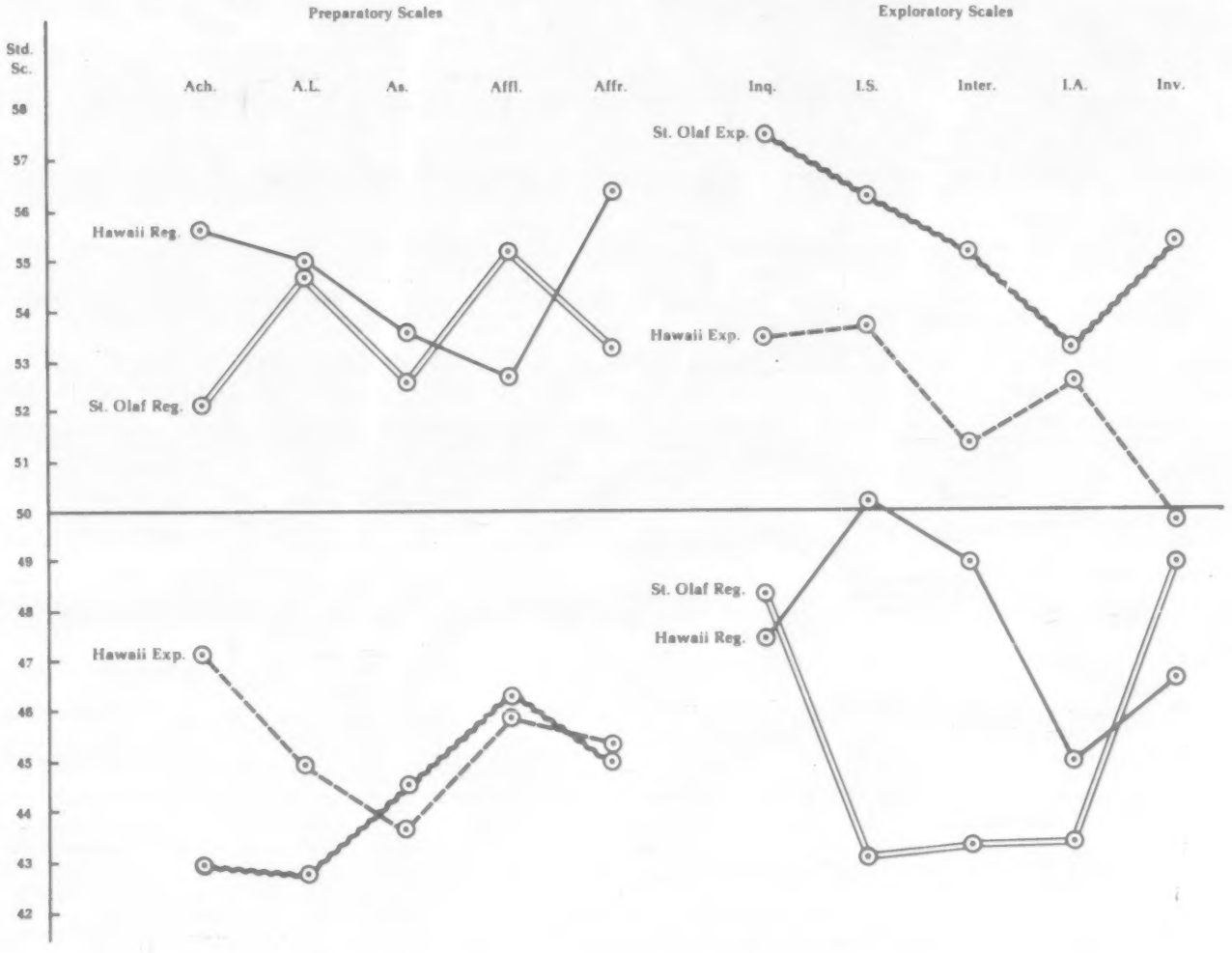
At each institution, the freshmen in the experimental program had higher mean scores on the Exploratory scales of the SOS when compared to their peers in the regular curriculum. Conversely, the experimental program students had lower mean scores than did their peers on the Preparatory scales. There were also substantial differences on certain scales when students in the two experimental programs and students in the two traditional curricula were compared on an inter-institutional basis.

For example, freshmen in the experimental Para-College program at St. Olaf's College had higher scores on four of five Exploratory scales of the SOS when compared to students in the New College experimental program at the University of Hawaii. In addition, freshmen in the regular academic curriculum at St. Olaf's College had lower mean scores on the Achievement, Affirmation, Independent Study, and Interaction scales when compared to their counterparts in the regular freshman year program at Hawaii. That there would be variation of this sort is not surprising as the two institutions are quite dissimilar with respect to size, orientation, and admissions policies.

Discussion

Based on analyses of the data presented, the SOS appears to be sensitive to the differing educational attitudes expressed by students in various institutional settings and curricular programs. This descriptive capability generally relates to the validity dimension of the SOS, as well as to the question of how the inventory can be used by researchers in the field of higher education. For example, one aspect of the impact or effectiveness of an academic program could be based in part on an analysis of the longitudinal changes in students' educational attitudes (Mor-

Figure 3
SOS PROFILES FOR FRESHMEN IN EXPERIMENTAL AND REGULAR CURRICULA



stain, 1973b).

Other research studies recently completed have also focused on the validity of the SOS. Pemberton (1973) has shown that students with various patterns of scholastic aptitude (as measured by SAT scores) have significantly different SOS profiles. Morstain (1973c) administered the Omnibus Personality Inventory and the SOS to a sample of undergraduates at three institutions and reported that students' educational attitudes were directly related to their general personality characteristics and orientations. In order to assess the relationship between individual orientations and perceptions of the collegiate environment, research studies employing the SOS and CUES and/or the Institutional Functioning Inventory would be of value.

Much discussion has also centered on the question of the relative "fit" of student and faculty educational attitudes, and what bearing this may have on student development. What is the degree of congruence or incongruence in educational attitudes and values for faculty and students, either in one class, one department, or the institution as a whole? This type of research may have implications for attempts to empirically validate hypotheses generated by the "challenge and response" conceptualization of student growth (Sanford, 1967).

From this theoretical perspective, gaining a better overview of student attitudes is only one side of the picture. Hence, a "Faculty Orientations Survey" has been recently developed in order to provide a means of assessing a

faculty member's educational attitudes and teaching orientations.[5] The items in this new inventory, with appropriate changes, correspond quite closely to items found in the SOS. In a study which was initiated in April 1973, researchers at the University of Delaware are exploring the degree of student-faculty congruence in educational attitudes and what relationship a "disparity" factor has with respect to how students evaluate their courses and instructors. The hypothesis under consideration is that the higher the degree of student-faculty attitude incongruence, a student's course/instructor ratings will be relatively lower when compared to the ratings of students in a "high congruence" situation.

Obviously, a host of other research questions could be developed (i.e. What are the educational attitudes of students who change academic majors or programs? What are the attitudes of students who withdraw from a college or university?). In sum, the type of research reported or suggested in this paper may have implications for considering an institution's academic policies and practices with reference to the question of educational outcomes. That is, many would argue that a college or university should place high priority on helping students assume responsibility for developing the kinds of educational experiences which are most appropriate to their particular goals, interests, and needs. In many respects, this concern is related to White's (1952) concept of the development of a "sense of competence" — in this case, that a student can have some say as to the nature of his academic experiences by taking an active role in shaping his own education. If a more personalized educational system is to occur, examining the education attitudes and orientations of students and faculty will of necessity assume more substantive priority in higher education research. Hopefully, a better understanding of teacher-student relationships and the effectiveness of various educational processes will result from these efforts.

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[5] For a full discussion of the development, validity, and reliability of the *Student Orientations Survey*, see Morstain (1973a). Available from the author.

[2] College of Steubenville, Concordia College (Minn.), Harcum Junior College, Muhlenberg College, St. Olaf's College, University of California at Davis, University of Delaware, University of Hawaii.

[3] F values from the analysis of variance on each scale were significant at the $p < .01$ level, with the exception of the Independent Study scale ($p < .05$).

[4] F values from the analysis of variance on each scale were significant at the $p < .01$ level.

[5] Copies of the SOS and FOS inventories are available from the author.

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COLLEGE DROPOUTS: THEORIES AND RESEARCH FINDINGS

William P. Fenstemacher, Minnesota State College System

At a time when most colleges are experiencing enrollment decreases and concomitant financial pressures, increased concern is placed upon student attrition. A recent national study by the American Council on Education indicated that approximately fifty-three percent (53%) of the entering freshmen do not achieve a baccalaureate degree in four years from the institution they entered as a freshman.[1] Approximately forty percent of the entering freshmen in four-year colleges do not complete a baccalaureate degree within five years of enrolling in college.[2] Colleges have become interested in the dropout, or the more recently defined stopout student, to determine ways in which the rate of attrition might be decreased.

The college dropout has been the subject of considerable research during recent years. Since most empirical studies of dropouts have been carried out either at single institutions or at the national level, with differing research methodologies, the findings are rarely comparable and cannot be applied to institutions in other settings. Inconsistencies in the findings of attrition studies may result from different populations, different institutional settings, varying definitions of dropouts, different research designs, insufficient data on the student and the college environment, and a relatively high nonresponse rate. The high nonresponse rate is a common research problem in studies of students who have withdrawn from college, since such studies are closely linked to college experiences which may be viewed negatively. The inability to distinguish between students who withdrew with unsatisfactory academic averages and those who withdrew in good academic standing is a severe limitation in interpreting the results of many studies.

Selected Studies of Attrition

Three studies of dropouts provide significant contributions to the research literature for their methodology, breadth of scope, and general quality: Alexander W. Astin's *College Dropouts: A National Profile*[3]; a study by Jerald Bachman and others, *Youth in Transition — Dropping Out*[4]; and a study by Robert Cope and others entitled *An Investigation of Entrance Characteristics Related to Types of College Dropouts*.[5]

College Dropouts: A National Profile

The purpose of Astin's research was to determine national dropout rates among full-time students attending two-year colleges, and four-year colleges and universities. For students attending four-year institutions, Astin used four measures of persistence:[6]

1. Enrollment for at least a second undergraduate year;
2. Receipt of a baccalaureate degree or its equivalent within four years of entry; (47% of the students received the baccalaureate degree within four years.)
3. Continued enrollment for work toward a degree in the same institution; (12% of the students were included in this category.)
4. Withdrawal from the inital institution with a subsequent request for a transcript sent to another institution. Approximately twenty percent of the students in Astin's study were included in this category.

These measures classify as dropouts only those students who left their first institution without completing a degree and who never requested transcript be sent to another institution. Using this definition, approximately twenty percent (20%) of the students in Astin's study were classified dropouts. When the forty-seven percent of the entering freshmen who completed a degree within four years is combined with the twelve percent (12%) who are still enrolled, a persistence rate of nearly sixty percent is achieved for students at four-year colleges and universities.[7] While Astin found the national dropout rate to be somewhat lower than had been suggested in other studies (McNelly[8]; Iffert[9]) approximately forty percent (40%) of the entering freshmen at four-year colleges do not complete a baccalaureate degree within five years of entrance.

Youth in Trasition — Dropping Out

The *Youth in Transition* research, a longitudinal study of high school youth, identifies factors which predict dropping out and determines the relationship between attrition and changes in self-esteem, self-concepts of ability, occupational aspirations, and delinquency. Bachman considered a commitment to education as a broader dimension than one which distinguished dropouts from persisters. The

students who felt education was very important were not only less likely to dropout, they were also more likely to extend their education beyond high school.[10] Consequently, Bachman conceived educational attainment as a continuum between high school entrance and post-high school education. The treatment of educational attainment as a continuum assumes that most factors which relate to dropping out of high school also relate, in an opposite direction, to extending one's education beyond high school. In his analysis, three groups of students were located on this scale of educational attainment: at one end of the continuum were the dropouts, at the other end were those who have entered college or other post-high school education, and between them were the non-college-bound high school graduates.[11]

Identifying educational attainment as a continuum is an important tool because it differentiates among high school students who continue their education beyond high school and those who do not. If no distinction were made between these two groups of persisters at the high school level, it would be possible to make an interpretive error between dropouts and students who stay in high school, when it is more meaningful to differentiate within the two groups of persisting high school students.

This methodology may be applied to any institution wishing to make distinctions within its student body. For example, two-year institutions could apply the methodology to differentiate among students who do and do not enter four-year institutions. Similarly, colleges could use this technique to distinguish between students who do and do not continue to graduate school or other important post-graduation activity.

Before reviewing Cope's studies, it seems pertinent to discuss the use of psychological and institutional variables in research on attrition. Recent studies utilizing the standardized psychological inventories such as the Minnesota Multiphasic Personality Inventory, the California Psychological Inventory, and the Omnibus Personality Inventory have shown that some psychological variables are related to college attrition. The research has shown substantial differences between dropouts and persisters and the findings illustrate the potential merit of considering psychological differences. A study by Rossman and Kirk at the University of California at Berkeley differentiated between "voluntary withdrawals" — students with grade point averages of 2.0 and above and "academic failures" — students with grade point averages below 2.0.[12] By distinguishing between these two types of dropouts, Rossman and Kirk found that "voluntary withdrawals" scored significantly higher than the Berkeley sophomores on two intellectual orientation scales, thinking introversion and estheticism, and lower on the practical outlook scale. The scores of the "academic failures" were slightly, but not significantly lower than the persisting students on the two intellectual orientation scales and slightly higher on the practical outlook scale. The use of psychological tests reveal differences between types of dropouts and types of persisters, re-emphasizing that dropouts should not be considered as a single group of students.

A growing body or research focuses on the relationship of the college environment, the individual's adjustment to college, and the process of dropping out. Several researchers have used the concepts of personal need and environmental press as a technique to study personal adjustment in college.[13] Using this approach, students are viewed as having certain needs with the strength of these needs characterized by one's personality. The college environment has the potential for satisfying or frustrating the needs of the student. The term "environmental press" is applied to the colleges potential to satisfy or thwart individual needs.

Environmental presses have been defined in terms of psychological characteristics — the need for order, a tolerance of ambiguity, practical orientation, intellectual orientation, and several others. When there is a discrepancy between personal needs and the ability of the environment to satisfy those needs, a student is more likely to dropout than a student who experiences a congruent relationship between his needs and environmental presses. Examples of studies using an institutional environmental approach are the previously cited research by Rossman and Kirk and Robert Cope.

An Investigation of Entrance Characteristics Related to Types of College Dropouts

The work of Robert Cope and others includes two studies, one at the University of Michigan during the mid-1960's and the other at the University of Washington in the early 1970's, institutions which were found to have similar student characteristics at the time of the research. In these studies, characteristics of the college environment were related to typologies of college dropouts.

Two major presses within the college environment were the social and academic. A social press was defined on the basis of demographic and attitudinal information such as the students' socioeconomic status, interest in social life, politics, esthetics and other items. An academic press was defined in terms of scores on measures of academic ability and personality orientations such as the Omnibus Personality Inventory.[14] The two dominant dropout typologies included those students who dropped out for social reasons, and those who left for academic reasons. Examples of academically-related reasons for leaving included a lack of intellectual challenge, fear of failure, or actual failure.

The research suggested that students may be incongruent with either or both of these major environmental presses. In such cases, students may choose to leave the

institution, voluntarily or involuntarily, or may remain at the institutions, depending upon the press and the personality trait being considered. Cope's data reveals that the social-psychological attributes of students differentiate between persisters and dropouts in institutions which have relatively unique social and/or academic presses.

The typologies were effective methodologically in evaluating dropouts at both the Univeristy of Michigan and the University of Washington and may be applicable at other institutions. Cope emphasized the necessity of differentiating within the total dropout population in order to recognize the complexity of the dropout phenomenon. For example, the relationship between the reasons for dropping out and the characteristics of the students who dropped out emerged only after the entire group of dropouts was analyzed for within group differences and such a typology and personality factors.

The institutional environmental approach appears to be a promising development in the research on student attrition. At the time the study by the Minnesota State College System was performed, psychological and institutional environmental data was not available. While there has been extensive research on attrition performed at major institutions such as the University of Michigan, Washington, and the University of California at Berkeley, similar research on dropouts within state colleges has received limited attention. The research within the Minnesota State College System may provide a comparative base for other studies within state colleges.

Results of the Minnesota State College Research

The Minnesota State College System undertook a study of students who had withdrawn from the six state colleges during the fall 1971 quarter. The purpose of the study was to provide demographic and attitudinal information on the dropouts and to identify factors contributing to student withdrawal. Examples of the desired information were the student's academic background, attitudes toward their educational experience, reasons for withdrawing, post-college activities and future educational plans.

The sample included Minnesota residents enrolled as full-time students during fall 1971 who did not re-enroll for the winter 1972 quarter.[13] Of the 2,493 Minnesota residents who withdrew during or immediately after the fall 1971 quarter, 2,114 or 85% were included in this study. Demographic and academic data on the 2,114 students were provided by the colleges. Questionnaires were mailed to an effective sample of 1,841 students. Forty percent of the questionnaires (729 of 1,841) were returned.

The following information describes the characteristics of the total group of dropouts compared with the characteristics of full-time undergraduates in the Minnesota State College System and the results of other attrition studies were pertinent. Additional data regarding the characteristics of dropouts and the general student body are available from the author.

Age: Twenty-seven percent of the dropouts were twenty-two years or older, which is identical to the age distribution of students enrolled in the Minnesota State Colleges. In other studies of dropouts, age differences were relevant only for those institutions which have a significant proportion of older students. The importance of the age variable lies in the increased experience; and diversified family and related demands and responsibilities that older students experience.

Sex: Fifty-four percent of the dropouts were men and forty-six percent were women—the same proportion of men and women enrolled in the state colleges. Attrition studies which have controlled for sex as an independent variable report conflicting findings, although the sex variable helps identify and explain dropout behavior when used in conjunction with other variables.

Marital Status: Seventeen percent of the dropouts were married, compared to only 12% of the undergraduate student body. Half of those who were married supported dependents. Other studies have noted that married students tend to withdraw more frequently than unmarried students.

High School Rank: Sixty percent of the dropouts were in the top half of their high school graduating class. The dropouts had a slightly lower high school rank than the students enrolled in the State College System. Consistent with other studies, there is generally a positive relationship between high school class rank and persistence in college.

ACT Scores: The median ACT composite score for the dropouts was 20 which approximates the median score of the students in the State College System. Other research has shown that dropouts usually have lower aptitude test scores than students continuing in college.

Parental Education: Sixty-two percent of the parents had not attended college. No comparative data for the undergraduate student body are available.

Parental Income: The median parental income at the time of entering college was $7,500 which approximates the parental income of the general student body. Other studies have indicated a trend which shows that the higher the socioeconomic status of the family, the higher the probability of graduating from college. It should be remembered, however, that there is an interdependent relation between education, occupation, and income. It is not any one of these factors alone which is related to persistence in college; it is rather the combined result of education, occupation, and values and, subsequently, on the socialization of the child.

Financial Dependence: Although fewer than half of the students were financially dependent upon their parents, slightly more than half of these students (54%) indicated parental incomes of $3,000 or less. Comparable data for the undergraduates enrolled in the Minnesota State Colleges are not available.

Financial Independence: Over half of the students who dropped out were financially self-supporting — a much higher incidence of self-support than occurs in the undergraduate student body. The financially independent students were generally older, married, and had dependents. Over half of the self-supporting students indicated incomes of $9,000 or more.

Academic Performance: Sixty-nine percent of the dropouts had grade point averages of 2.0 and above at the time if withdrawal, with a median average of 2.6 after almost two years of study. In contrast, the dropouts with unsatisfactory academic averages — 31 percent of the total group of dropouts — had a median grade point average of 1.5 after only one year of study. In comparison, 58 percent of the students enrolled in the Minnesota State College System had cumulative grade point averages of 2.0 and above, while 42 percent averaged 1.9 or lower. The data indicate that the dropouts had higher academic averages than the currently enrolled students.

In general, the results support the findings of the Astin and Cope studies that lower scores on measures of academic ability, as defined by high school rank and test scores, and lower levels of parental education are related to attrition.

Tables 1 and 2 compare the dropouts in the Minnesota State College System on several significant biographical and academic items differentiated by sex and grade point average (Table 1), and combinations of these variables (Table 2). Students with grade point averages of 1.9 or less have been identified in the tables as "academic failures," and those with academic averages of 2.0 as "voluntary withdrawals."

Reasons For Dropping Out

Students rated ten statements commonly given as reasons for leaving or dropping out of college as being "very important," "somewhat important," or "an unimportant factor" in their decision to withdraw. The four reasons rated as either "very" or "somewhat important" in the decision to withdraw were the following:

— Insufficient financial resources: 48%
— Disappointed with the academic program: 48%
— Unhappy with the college experience: 47%
— Academic program not available: 38%

(Since students could indicate more than one reason as "very" or "somewhat important," the percentages exceed 100%).

A factor analysis of these four items indicates three distinct reasons for withdrawal: the lack of financial resources; a general disappointment with the academic program combined with a general unhappiness with the college experience; and the unavailability of the academic program in which the student was interested.

However, three factors appear unique in the study of dropouts of the Minnesota State College System:

1. The importance of insufficient financial resources as a reason for dropping out was related to a reluctance to apply for financial assistance.
2. The relatively large group of dropouts who were self-supporting. Other studies of dropouts have not distinguished between financial dependence and independence.
3. The general disappointment with the academic program and unhappiness with the college experience.

Table 1

COMPARISON OF BIOGRAPHICAL AND ACADEMIC VARIABLES AMONG DROPOUTS BY SEX AND GRADE POINT AVERAGE

Biographical and Academic Variables	SEX			GRADE POINT AVERAGE		
	Men N = 1151	Women N = 963	t	Academic Failures N = 507	Voluntary Withdrawals N = 1134	t
Age	> 20 yrs	< 20 yrs	8.36**	< 20 yrs	> 20 yrs	5.00**
Sex	—	—	—	Failures were more likely to be men		8.98**
High School Rank	Third Quartile	Second Quartile	5.52**	Third Quartile	Second Quartile	5.72**
ACT English						
M	16.2	18.9	10.25**	16.1	18.0	5.95**
SD	5.2	5.4		5.1	5.5	
ACT Math						
M	19.1	18.2	2.68*	17.4	19.1	4.33**
SD	7.0	6.7		6.6	7.1	
ACT Composite						
M	19.2	19.6	1.57	18.0	20.1	6.98**
SD	5.5	5.2		5.0	5.5	
Qtr. Hrs Competed						
M	74.2	71.7	0.97	47.9	87.3	13.86**
SD	54.3	54.9		39.7	58.2	
Satisfaction with Academic Program	Men were less satisfied		1.26	Failures were less satisfied		3.41*
GPA						
M	2.06	2.46	12.05**	1.46	2.59	45.36**
SD	.64	.70		4.2	.48	

Note - The means and standard deviations or the direction of the difference between men and women, or academic failures and voluntary withdrawals are reported above. The direction of the difference is indicated if the mean of the variable was not self-explanatory. The number of respondents varied with each item.

* $p = < .01$
** $p = < .001$

Table 2

COMPARISON OF BIOGRAPHICAL AND ACADEMIC VARIABLES FOR ACADEMIC FAILURES AND VOLUNTARY WITHDRAWALS BY SEX

Biographical and Academic Variables	MEN			WOMEN		
	Academic Failures N = 361	Voluntary Withdrawals N = 532	t	Academic Failures N = 146	Voluntary Withdrawals N = 601	t
Age	20 yrs	> 20 yrs.	5.67***	19 yrs.	20 yrs	4.43***
High School Rank	Third Quartile	Second Quartile	2.14*	Third Quartile	Second Quartile	4.31***
ACT English						
M	15.5	16.9	3.46***	17.6	18.9	2.46*
SD	5.1	5.2		5.0	5.6	
ACT Math						
M	18.0	19.9	3.51***	15.8	18.5	4.00***
SD	6.6	7.4		6.3	6.7	
ACT Composite						
M	18.2	20.2	4.94***	17.4	20.0	5.08***
SD	5.1	5.7		4.6	5.4	
Qtr. Hrs Completed						
M	51.0	93.8	12.15***	40.4	81.5	8.20***
SD	39.5	58.5		39.2	57.3	
Satisfaction with Academic Program	Failures were less satisfied		1.96*	Failures were less satisfied		2.88**
GPA						
M	1.47	2.46	34.92***	1.45	2.70	27.49***
SD	.42	.41		.42	.51	

Note - The means and standard deviations or the direction of the difference between the academic failures and voluntary withdrawals for men and women are reported above. The direction of the difference is indicated if the mean of the variable was not self-explanatory. The number of respondents varied with each item.

* $p = < .05$
** $p = < .01$
*** $p = < .001$

Insufficient Financial Resources as a Reason for Dropping Out

The dropouts were separated into two groups on the basis of financial dependence. Fifty-four percent (54%) of those who were dependent on parental support came from families with incomes of $3,000 or less. Within this group, only fifty-one percent (51%) applied for financial aid and seventy-six percent (76%) received assistance. Seventy-five percent (75%) of the financial aid recipients indicated that the amount of assistance was sufficient to meet their reasonable financial needs. Despite the low parental income level, a relatively small percentage, only sixty-three percent (63%), indicated the lack of financial resources as an important reason for withdrawing from college. Why did such a small percentage of students from low income families apply for financial aid? Among possible explanations are the following:

1. Students from low income families percieve a low potential for success in college and are reluctant to apply for financial assistance.
2. A strong protestant ethnic of self-support exists among students from low income families. A large number of students work part-time while in college. Rather than apply for financial aid, these students would prefer to withdraw or stopout when their resources depleted, earn additional money, and then return to college.
3. An unawareness that financial aid is available.
4. A reluctance to apply for or accept loans since low income families have a history of indebtedness.

One might anticipate that a large percentage of the students who indicate financial independence have low incomes. However, in the Minnesota State College study, only eleven percent (11%) of the self-supporting students had incomes of $3,000 or less. Sixty-two percent (62%) of the self-supporting students reported incomes exceeding $9,000. Only thirty-four percent (34%) of the self-supporting students applied for financial assistance.

When the total group of dropouts is differentiated into groups by sex and grade point average below and above 2.0, and then combinations of sex and grade point average, the problem of financial resources is shown to be related to certain groups of dropouts. Tables 3 and 4 compare the dropouts on the reasons for leaving college by sex and grade point average (Table 3), and combinations of these variables (Table 4).

The data in Tables 3 and 4 show that the lack of financial resources was a more important problem for men than for women, and specifically for men with satisfactory academic averages. The most important reason given for dropping out among men with satisfactory grade point averages was a lack of financial resources. In contrast, men with unsatisfactory academic averages ranked insufficient financial resources fourth, after low grade, unhappiness with the college experience, and a disappointment with the academic program.

The three most important reasons for women leaving college were a disappointment with the academic program, a lack of financial resources, and an unhappiness with college as the three most important reasons for dropping out.

Many of the attrition studies during the last twenty years indicated that both men and women frequently cited dissatisfaction with the college environment, lack of interest in studies, uncertain academic major and undefined career plans as motives underlying the decision to withdraw. The major difference between two studies performed during the 1950's (Iffert[16], and Slocum[17]) and a study in the 1960's (Astin and Panos[18]) is that the students in the later study were withdrawing more for reasons of dissatisfaction with the college environment and unsettled personal interests and goals. Over the past 15 or 20 years, there appears to be an increasing tendency to cite personal factors related to dropping out — a lack of fit between the student and the institutional environment, and undefined personal objectives. This suggests that students today, in comparison with the students in the 1950's, are more concerned with the relevance of education to their personal growth and development.

Attitude Toward the Academic Program

Students who withdrew were generally satisfied with their educational experience although they believed the quality of instruction and the teaching-learning process could be improved. In response to a question about their academic program, thirty-five percent (35%) were satisfied with their education, fifty-two percent (52%) had mixed feelings, and thirteen percent (13%) were dissatisfied with their education.

The quality of the faculty and course content were positively mentioned by twenty-two percent (22%) of the students, yet a slightly higher percentage of students, approximately twenty-seven percent (27%), were dissatisfied with the instruction and course content. Forty-two percent (42%) of the students felt their courses were not as intellectually challenging as they had anticipated.

Nineteen percent (19%) of the students were dissatisfied with required courses; thirteen percent (3%) recommended elimination of general education courses or placing less emphasis on general education courses.

The results of the study suggest several curricular areas to be examined:

— the purpose and the value of general education courses;
— the opportunity for students to begin concentrating in a major field as a freshman;
— the need to maintain contact with students who have voluntarily withdrawn and who are interested in continuing their education, through off-campus and

Table 3

IMPORTANCE OF REASONS FOR WITHDRAWAL FOR DROPOUTS BY SEX AND GRADE POINT AVERAGE

MEANS AND STANDARD DEVIATIONS

Importance of Reason for Withdrawal*	SEX			GRADE POINT AVERAGE		
	Men N = 333	Women N = 388	t	Academic Failures N = 167	Voluntary Withdrawals N = 402	t
Academic Program Unavailable						
M	2.38	2.30	1.24	2.33	2.41	11.1
SD	.75	.83		.76	.77	
Low GPA				(#1)		
M	2.46	2.72	4.86***	1.93	2.85	16.90***
SD	.76	.56		.76	.43	
To Get Married						
M	2.90	2.63	5.68***	2.87	2.72	2.55*
SD	.38	.71		.45	.63	
Disappointment with Academic Program	(#3)	(#1)		(#3)	(#2)	
M	2.22	2.16	0.84	2.05	2.27	2.72**
SD	.78	.81		.78	.79	
Not Enough Money	(#1)	(#3)			(#1)	
M	2.04	2.27	3.48***	2.15	2.12	0.43
SD	.83	.81		.80	.85	
Health Reasons						
M	2.81	2.70	2.36**	2.77	2.78	0.21
SD	.51	.67		.56	.57	
Enlisted or Drafted						
M	2.68	2.92	5.32***	2.78	2.82	0.63
SD	.70	.37		.60	.55	
Unhappy with College Experience	(#2)	(#2)		(#2)	(#3)	
M	2.15	2.21	0.95	1.99	2.29	3.68***
SD	.83	.83		.84	.80	
Family Responsibilities						
M	2.73	2.58	2.72**	2.68	2.65	0.47
SD	.60	.72		.65	.68	
Unsatisfactory Housing						
M	2.68	2.64	0.71	2.67	2.67	0.12
SD	.61	.64		.63	.63	

Note - * The numbers in parentheses indicate the rank among the three most important reasons for withdrawal within each group.

The code ranged from 1 to 3; 1 = Reason was rated "very important;" 2 = "somewhat important;" 3 = "not at all important" in the decision to withdraw. The number of respondents varied with each variable.

* $p = < .05$
** $p = < .01$
*** $p = < .001$

Table 4

IMPORTANCE OF REASONS FOR WITHDRAWALS FOR ACADEMIC FAILURES AND VOLUNTARY WITHDRAWALS BY SEX

MEANS AND STANDARD DEVIATIONS

Importance of Reason for Withdrawal *	MEN			WOMEN		
	Academic Failures N = 116	Voluntary Withdrawals N 157	t	Academic Failures N = 51	Voluntary Withdrawals N = 244	t
Academic Program Unavailable						
M	2.41	2.46	0.55	2.15	2.38	1.70
SD	.71	.72		.82	.80	
Low GPA	(#1)			(#3)		
M	1.89	2.78	10.09**	2.00	2.89	13.12**
SD	.79	.55		.67	.33	
To Get Married						
M	2.92	2.88	0.85	2.76	2.62	1.15
SD	.34	.43		.62	.72	
Disappointment with Academic Program	(#3)	(#3)		(#2)	(#1)	
M	2.13	2.33	1.98	1.88	2.23	2.63*
SD	.79	.76		.75	.80	
Not Enough Money		(#1)			(#2)	
M	2.15	1.94	1.93	2.16	2.24	0.54
SD	.79	.85		.84	.83	
Health Reasons						
M	2.75	2.86	1.70	2.82	2.73	0.84
SD	.59	.42		.51	.64	
Enlisted or Drafted						
M	2.69	2.64	0.54	3.00	2.94	1.18
SD	.69	.74		.00	.33	
Unhappy with College Experience	(#2)	(#2)		(#1)	(#3)	
M	2.07	2.25	1.58	1.82	2.33	3.86**
SD	.86	.80		.78	.80	
Family Responsibilities						
M	2.69	2.75	0.78	2.66	2.58	0.60
SD	.67	.55		.63	.75	
Unsatisfactory Housing						
M	2.67	2.70	0.42	2.67	2.66	0.10
SD	.63	.61		.62	.64	

Note - * The numbers in parentheses indicate the rank among the three most important reasons for withdrawal within each group.

The code ranged from 1 to 3; 1 = Reason was rated "very important;" 2 = "somewhat important;" 3 = "not at all important" in the decision to withdraw. The number of respondents varied with each variable.

* $p = < .01$
** $p = < .001$

external studies programs.

The purpose and value of general education and the liberal arts need to be examined in the context of the questions which students are facing today, questions involving the role of the liberal arts among a pragmatically oriented student body. Rather than require courses of all students within the first two years, an alternative might be an arrangement which would allow students to demonstrate a competency in the liberal arts prior to graduation. This would enable students who enter college intent on completing a major the opportunity to take the courses in which they are interested rather than postpone the courses for two years. If the student were allowed, with the guidance of faculty, to design a series of experiences in the liberal arts, he should be able to develop a program of study complimentary to a major area of study, an intended vocation, and larger societal concerns.

By eliminating the general education or liberal arts requirements, faculty might have the freedom to design courses which may have greater appeal to students. An appreciation of the liberal arts cannot be attained through regulations. The college environment — the student, faculty, in and out-of-class activities — should compliment and encourage an interest in and appreciation of the arts.

The vast majority of students who dropped out of the Minnesota State Colleges plan to continue their post-secondary education. Approximately forty percent (40%) were enrolled in a college or vocational school during the immediate next quarter, and eighty percent (80%) intend to enroll in a school or college during the next year. With such a large number of students planning to continue their education, we are dealing with a stopout phenomenon, one in which students temporarily withdraw from the formal post-secondary program to participate in more meaningful activities. For students who cannot continue as on-campus students, external studies arrangements provide an opportunity for these individuals to continue to study and maintain contact with the faculty and the college.

Summary

This paper has briefly reviewed selected research on college dropouts and discussed the findings of several attrition studies. Dropping out of a college is a very complex process and comprehension of the problem requires a substantial amount of information about the student and the institution. The diversity within the dropout group indicates that dropouts should not be grouped into one category for analysis since the significant factors related to the attrition of one group of dropouts will very likely be masked by the total group. At a minimum, distinctions should be made on grade point average, sex, and combinations of these variables.

In addition to the importance of biographical, academic, and psychological information on students, the research involving the relationship between the student and the college environment appears likely to have the most relevance in increasing our understanding of the dropout phenomenon. The student-environmental fit approach simultaneously studies the effects of several biographical, educational, psychological, and environmental variables. To implement this approach, colleges will need to obtain psychological data on the student body, from which information about environmental press may be derived.

Several findings from the Minnesota State College research have, hopefully, contributed to the information on dropouts.

- Information regarding the dependence-independence of parental financial support appears to be important. The extent of self-support among the stopouts in the Minnesota State Colleges was higher than anticipated.
- Financial difficulty, or the lack of financial resources, was among the three or four most frequently cited reasons for withdrawal. However, when the total group of dropouts was differentiated by sex and academic average, the lack of financial resources was the dominant reason for withdrawal of only one group — men with satisfactory academic averages.
- Students with unsatisfactory academic averages tend to view their college experience in negative ways. While they perhaps correctly attribute their primary reason for leaving college as an unsatisfactory academic average, the worry and fear of failure apparently spills over into an unhappiness with the college experience and a disappointment with the academic program. A lack of financial resources was ranked fourth by students with unsatisfactory averages, so we can assume that they were not primarily worried about their financial ability to remain in college.
- Information regarding student attitudes toward the academic program provides a means of assessing consumer response to the academic fare. The educational experiences identified as significantly positive or negative, and the reasons for these comments, should be explored to identify possible areas of curricular or instructional change. For example, there may be areas of the academic program which students with certain important characteristics, such as the voluntary withdrawals, believe the college is doing well, and areas which might be improved. The findings may then be used to support alternative curricular programs designed to more adequately satisfy student needs.

[1] Alexander W. Astin, *College Dropouts: A National Profile*. Research Report, Vol. 7, No. 1. Washington: American Council on Education, 1972, p. 10.

[2] *Ibid.*, p. 49.

[3] *Ibid.*

[4] Jerald G. Bachman, Swayzer Green, and Ilona D. Wirtanen, *Youth in Transition - Dropping Out*. Vol. III. Ann Arbor, Michigan: Institute for Social Research, 1971.

[5] Robert G. Cope, Raymond G. Hewitt, Keith G. Pailthorp, Michael Skaling, and David C. Trapp. *An Investigation of Entrance Characteristics Related to Types of College Dropouts*. Washington: U.S. Office of Education, 1971.

[6] Astin, p. 4.

[7] Astin, p. 10.

[8] J.H. McNelly, *College Student Mortality*. Washington: U.S. Office of Education, Bulletin 1937, No. 11, 1938.

[9] Robert E. Iffert, *Retention and Withdrawal of College Students*. Washington: U.S. Office of Education, 1957, Series 1958, No. 1.

[10] Bachman and others, p. 7.

[11] *Ibid.*, p. 8.

[12] Jack E. Rossmann and Barbara A. Kirk, "Factors Related to Persistence and Withdrawal among University Students," *Journal of Counseling Psychology*, XVII, No. 1, pp. 56-62.

[13] Several original sources describing the concepts of personal need and environmental press include:
H.A. Murray, *Explorations in Personality*. New York: Oxford University Press, 1938.
C.R. Pace, "Implications of Differences in Campus Atmosphere for Evaluation and Planning of College Programs," R.L. Sutherland et al. (Eds.), *Personality Factors on The College Campus: Review of a Symposium*. Austin, Texas: The Hogg Foundation for Mental Health, University of Texas, 1962, pp. 43-61.
C.R. Pace and G.G. Stern, "An Approach to the Measurement of Psychological Characteristics of College Environments," *Journal of Educational Psychology*, LI, pp. 269-277.
G.G. Stern, "Environments for Learning," N. Sanford (Ed.), *The American College: A Psychological and Social Interpretation of the Higher Learning*. New York: Wiley, 1962, pp. 690-730.

[14] Cope and others, pp. 84-94.

[15] In the Minnesota State College study, a dropout was defined as a state resident enrolled full-time during fall 1971 who did not re-enroll the following terms as a full- or part-time student. This definition includes as dropouts the students with both satisfactory and unsatisfactory academic averages, although a distinction was made between these two groups: those with satisfactory academic averages were classified as "voluntary dropouts," those with unsatisfactory averages as "involuntary dropouts." Some researchers have noted the imprecision of the term "dropout." Students who voluntarily withdraw are generally considered dropouts, although a number of these students may transfer to another institution and/or subsequently return to the initial institution. The term "stopout" has recently been used to refer to students who temporarily leave post-secondary education and return at a later time.

[16] Iffert.

[17] W.L. Slocum, *Academic Mortality at the State College of Washington*. Pullman: State College of Washington, 1956.

[18] Alexander W. Astin and Robert J. Panos, *The Educational and Vocational Development of College Students*. Washington: American Council on Education, 1969.

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